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VOLUME 8, NUMBER 13 JULY 1, 1975 SELECTED WATER RESOURCES ABSTRACTS is published semimonthly for the Water Resources Scientific Information Center (WRSIC) by the National Technical Information Service (NTIS), U.S. Department of Commerce. NTIS was established September 2, 1970, as a new primary operating unit under the Assistant Secretary of Commerce for Science and Technology to improve public access to the many products and services of the Department. Information services for Federal scientific and technical report literature previously provided by the Clearinghouse for Federal Scientific and Technical Information are now provided by NTIS.

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SELECTED

WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center, Office of Water Research and Technology, U.S. Department of the Interior



VOLUME 8, NUMBER 13JULY 1, 1975

W75-06351 -- W75-06850

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the Water Resources Thesaurus. Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCU-MENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established disciplineoriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center Office of Water Research and Technology U.S. Department of the Interior Washington, D. C. 20240

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01 NATURE OF WATER

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02 WATER CYCLE

Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION

Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL

Includes the following Groups: Control of Water on the Surface; Groundwater Management; Effects on Water of Man's Non-Water Activities: Watershed Protection.

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06 WATER RESOURCES PLANNING

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07 RESOURCES DATA

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08 ENGINEERING WORKS

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09 MANPOWER, GRANTS, AND FACILITIES

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10 SCIENTIFIC AND TECHNICAL INFORMATION

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ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

2. WATER CYCLE

2A. General

TEMPERATURE EFFECTS ON GREAT LAKES WATER BALANCE STUDIES. State Univ. of New York, Buffalo. Dept. of Civil

For primary bibliographic entry see Field 2H. W75-06448

A SURROGATE-PARAMETER APPROACH TO MODELING GROUNDWATER BASINS.

Colorado State Univ., Fort Collins. Dept. of Civil Engineering. For primary bibliographic entry see Field 2F.

DEVELOPMENT OF A STORM RUN-OFF PRE-DICTION MODEL WITH SIMULATED TEM-PORAL RAINFALL DISTRIBUTION, Meteorological Office, New Delhi (India). For primary bibliographic entry see Field 2E. W75-06453

COMPARISON OF HYDROLOGIC AND YDRAULIC CATCHMENT ROUTING HYDRAULIC PROCEDURES,

University Coll., Galway (Ireland). For primary bibliographic entry see Field 2E. W75-06456

RELATIONS BETWEEN PLANIMETRIC AND HYPSOMETRIC VARIABLES IN THIRD-AND FOURTH-ORDER DRAINAGE BASINS,

New Univ. of Ulster, Coleraine (Northern Ireland). School of Biological and Environmental Studies

D. N. Wilcock. Geological Society of America Bulletin, Vol 86, No 1, p 47-50, January 1975. 3 fig, 3 tab, 8 ref.

Descriptors: *Geomorphology, *Terrain analysis, *Drainage density, *Drainage patterns(Geologic), Streams, Drainage, Drainage systems, Watersheds(Basins), Hypsometric analysis, Streams, Drainage, Drainage systems, Watersheds(Basins), Hypsometric analysis, Foreign countries, Europe, Foreign research, Geology, Topography, Distribution, Networks. Identifiers: "Stream frequency, Stream order, Stream planimetric variables, England, Scotland.

Analyses of relief distribution and drainage dis-tribution within individual drainage basins suggested that relative density (stream frequency divided by the square of drainage density), a dimen-sionless variable describing a planimetric charac-teristic of stream organization in a basin, is related to the hypsometric integral (HI), a dimensionless variable describing the distribution of relief within a basin. The nature of this relation seems to be important in explaining much of the scatter in the graphical relations between stream frequency (F) and drainage density (D). The results suggested that, within any sample of drainage basins, the distribution of individual basin HI values about the sample mean HI value might influence the value of k in the relation of F equals a constant time D to the k power. (Lee-ISWS) W75-06459

INTERNATIONAL HYDROLOGICAL DECADE REPRESENTATIVE AND EXPERIMENTAL BASINS IN THE UNITED STATES: CATALOG OF AVAILABLE DATA AND RESULTS, 1965-1972.

National International Committee for the Hydrological Decade, Washington, D.C. Available from the National Technical Informa-tion Service, Springfield, Va 22161 as PB-237 002, in paper copy, \$2.25 in microfiche.

NAS/IHD-74/01, July 1974. 149 p, 1 fig. NSF

Descriptors: *Demonstration watersheds. *Data collections, *International Hydrological Decade, Basins, *Watersheds(Basins), Research and development, Information exchange, Watershed

The data collected in studies of the 60 International Hydrological Decade representative and experimental basins in the United States were briefly described. The main results were listed of the hydrological studies undertaken in those basins within the framework of, and as contributions to. the Decade. The report emphasized: (1) the objectives of studies in each area, (2) the significant results of the studies in each area, and (3) the data that are now available for exchange. There is a section on 'Reports Available Publicly' for each basin listed. (Jess-ISWS) W75-06472

STATE OF THE SEA AROUND TROPICAL CYCLONES IN THE WESTERN NORTH PACIFIC OCEAN,

Environmental Prediction Research Facility (Navy), Monterey, Calif. S. Brand, J. W. Blelloch, and D. C. Schertz.

Journal of Applied Meteorology, Vol 14, No 1, p 25-30, February 1975. 4 fig, 3 tab, 14 ref.

Descriptors: *Ocean waves, *Tropical cyclones, *Pacific Ocean, Waves(Water), Winds, Regression analysis, Forecasting, Oceanography, Typhoons, Storms. Meteorology,

The combined sea-height data for the year 1971 for the western North Pacific Ocean were examined to determine the sea-state characteristics around tropical storms and typhoons. The results showed that the areal extent about the storms of the combined sea height in the 9-15 ft range is primarily a function of storm duration, intensity (maximum sustained wind), and size. Equations derived by linear regression techniques were presented for describing the state of the sea about tropical cyclones. (Sims-ISWS) W75-06495

A STUDY OF EDDY FLUXES OVER A FOREST. Commonwealth Scientific and Industrial Research Organization, Aspendale (Australia). Div. of Atmospheric Physics.
For primary bibliographic entry see Field 2I.

W75-06498

A METHOD OF REMOVING LAMB WAVES FROM INITIAL DATA FOR PRIMITIVE EQUA-

TION MODELS. National Center for Atmospheric Research, Boulder, Colo. For primary bibliographic entry see Field 2B.

ESTIMATING THE VARIANCE OF TIME

Hawaii Univ., Honolulu. Dept. of Information and Computer Science. For primary bibliographic entry see Field 7C. W75-06502

ON PARAMETERIZATION OF TURBULENT TRANSPORT IN CUMULUS CLOUDS.

National Oceanic and Atmospheric Administration, Coral Gables, Fla. Experimental Meteorology Lab.

or primary bibliographic entry see Field 2B. W75-06513

REPRESENTATIVENESS OF WATERSHED PRECIPITATION SAMPLES.

Virginia Univ., Morgantown. Water Research Inst.

For primary bibliographic entry see Field 2B. W75-06522

MARKOV MIXTURE MODELS FOR DROUGHT LENGTHS.

Harvard Univ., Boston, Mass. Graduate School of **Business Administration** B. B. Jackson.

Water Resources Research, Vol 11, No 1, p 64-74, February 1975, 6 fig. 5 tab, 12 ref.

Descriptors: *Droughts, *Markov processes, Streamflow, Synthetic hydrology, Probability, Dry seasons, Wet seasons, Model studies, Annual, nning, *Massachusetts.

Identifiers: *Markov mixture models, *Quaboag River(Mass).

The generation of synthetic streamflow records for use in simulation studies of potential hydrologic designs was illustrated. Markov mixture models combined a Markov model for transitions between low and normal streamflow states with a mixture model blending to normal subpopulations. The models were particularly effective for generating synthetic streamflow records with long and severe droughts. They were used in a hypothetical planning problem to illustrate the application of a set of modeling precepts. (Roberts-ISWS) W75-06545

BIRTH-DEATH MODELS FOR DIFFERENTIAL PERSISTENCE,

Harvard Unov., Boston, Mass. Graduate School of Business Administration. For primary bibliographic entry see Field 2E. W75-06546

ESTIMATING INFILTRATION FOR ERRATIC RAINFALL.

Oak Ridge National Lab., Tenn. For primary bibliographic entry see Field 2G. W75-06548

FORECASTING SNOWMELT RUNOFF IN THE

UPPER MIDWEST,
Minnesota Univ., Minneapolis. Dept. of Civil and Mineral Engineering.

A. F. Pabst Available from the National Technical Informa-Available 10th the National Technical Information Service, Springfield, Va 22161, as PB-241 179, \$6.25 in paper copy, \$2.25 in microfiche. PhD Thesis, June 1973. 160 p, 46 fig, 11 tab, 68 ref. OWRT B-077-MINN(1), 14-31-0001-3902.

Descriptors: Flooding, Flood control, *Flood forecasting, *Runoff, *Mathematical models, Minnesota, *Model studies, Snowmelt, Watershed management, Frozen soils. Identifiers: *Minnesota River Basin(Minn).

The performance of two mathematical runoff models, the SSARR model and HEC-1 model were evaluated with respect to their usefulness in com-puting snowmelt floods on a medium-sized Upper Midwest watershed. The continuous-accounting feature of the SSARR model makes it very valuable for simulating records containing a series of wet and dry periods. For snownelt computations in the Midwest the SSARR model's ability to represent an area as a split basin with differing characteristics and to gradually change from one representation to the other is a marked advantage over HEC-1. With certain modifications either over rick-1. With certain modifications either model will adequately perform snowmelt flood predictions in the Upper Midwest. As a result of applying these models to the Minnesota River Basin, certain conclusions can be drawn. The average water equivalent in the snowpack, the ex-

Group 2A-General

pected additional precipitation, the expected air temperatures, and the existing surface and frost conditions must all be known for a reliable forecast. If a glazed surface and tightly forzen ground conditions had existed in 1969, the peak discharge near the mouth of the Minnesota River could possibly have been 168,000 cfs—twice the observed peak. The type of frozen soil appears to have a greatef effect on controlling runoff than the thickness of the frozen layer. A relationship was developed, by multiple regression, which yields the volume of runoff between mid-March and April 30. With loss coefficients selected for each specific sub-basin, each year, the comprehensive streamflow model may predict flood runoff hydrographs more accurately W75-06648

2B. Precipitation

AGRICULTURAL DROUGH PROBABILITIES IN TENNESSEE,

Tennessee Univ., Knoxville. Dept. of Plant and Soil Science.

For primary bibliographic entry see Field 3F. W75-06358

WEATHER MODIFICATION ACTIVITIES IN

TEXAS, 1973, Texas Water Development Board, Austin. Weather Modification and Technology Div. For primary bibliographic entry see Field 3B. W75-06464

A RADIOSONDE THERMAL SENSOR TECHNIQUE FOR MEASUREMENT OF AT-MOSPHERIC TURBULENCE,

National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center. J. L. Bufton.

Available from the National Technical Informa-tion Service, Springfield, Va 22161 as NASA TND-7867, \$3.75 in paper copy, \$2.25 in microfiche. NASA Technical Note D-7867, February 1975. 41 p, 12 fig, 3 tab, 28 ref.

Descriptors: *Instrumentation, *Radiosondes, *Turbulence, *Remote sensing, *Atmosphere, Eddies, Optical properties, Frequency, Distribution,

Measurement. Identifiers: *Thermosonde, Scintillation, Laser propagation.

A new system was developed to measure vertical profiles of microthermal turbulence in the free atmosphere. It combines thermal sensor technology with radiosonde balloon systems. The resultant data set from each thermosonde flight is a profile of the strength and distribution of microthermal fluctuations which act as tracers for turbulence. The optical strength of this turbulence is computed and used to predict optical and laser beam propagation statistics. A description of the flight payload, examples of turbulence profiles, and comparison with stimultaneous stellar observa-tions were included. (Jones-ISWS) W75-06476

METEOROLOGICAL INTERPRETATION OF SPACE PHOTOGRAPHS OF THE EARTH (QUANTITATIVE METHODS),

For primary bibliographic entry see Field 7C. W75-06488

STATE OF THE SEA AROUND TROPICAL CYCLONES IN THE WESTERN NORTH PACIFIC OCEAN,

Environmental Prediction Research Facility (Navy), Monterey, Calif. For primary bibliographic entry see Field 2A. W75-06495

A PORTABLE AEROSOL DETECTOR OF HIGH SENSITIVITY, State Univ. of New York, Albany. Atmospheric

Sciences Research Center. For primary bibliographic entry see Field 5A. W75-06496

A METHOD OF REMOVING LAMB WAVES FROM INITIAL DATA FOR PRIMITIVE EQUA-

National Center for Atmospheric Research, Boulder, Colo. W. M. Washington, and D. P. Baumhefner.
Journal of Applied Meteorology, Vol 14 No 1, p
114-119, February 1975. 3 fig, 1 tab, 13 ref.

*Mathematical Descriptors: *Atmospheric pressure, *Winds, Forecasting, Numerical analysis, Model studies, Meteorology,

Atmsophere, Atmospheric physics.
Identifiers: Geostrophic winds, Divergence, Convergence. Lamb waves.

A simple method of reducing the amplitude of Lamb waves in primitive equation model forecasts was proposed and tested. This method makes use of a Boussinesq-type approximation in which the vertical mean mass divergence is set equal to zero. It effectively reduces the Lamb waves by a factor of 3 in the example shown and does not degrade the forecast accuracy. The largest reduction in Lamb wave amplitude was found in the tropical re-gions. (Sims-ISWS) W75-06499

CHLORIDES IN NATURAL AND ARTIFICIAL

HAILSTONES, Istituto di Fisica dell'Atmosfera, Verona (Italy). Osservatorio Scientifico.

F. Prodi. Journal of Applied Meteorology, Vol 14, No 1, p 120-124, February 1975. 3 fig, 8 ref.

Descriptors: *Hail, *Precipitation(Atmospheric), *Chemistry of precipitation, *Cloud physics, *Chlorides, Salts, Membranes, Ice, Bubbles,

Meteorology.

Identifiers: *Artificial hailstones, Growth of hail-

A membrane filter technique for precisely locating chlorides on any prepared ice surface was tested on hailstone cross sections. Chloride patterns, different in intensity in the various growth stages of the hailstones, were detected along the grain boundaries. To relate the environmental growth conditions of the hailstones to the chloride distributions, the filter technique was applied to deposits of ice grown by accretion in a wind tunnel from droplets known NaCl concentrations. showed a dependence of the chloride distributions on time and temperature of storage: initially chlorides are uniformly distributed in the lattice structure and subsequently segregate to the grain boundaries during storage at temperatures close to OC. It was suggested that the technique, especially when performed on freshly fallen hailstones, may contribute in inferring growth conditions of the hailstones in the parent cloud and their trajecto-ries, provided that a realistic model of the chloride concentration in the liquid water of the hailcloud is outlined. (Sims-ISWS) W75-06500

AN APT SIGNAL SIMULATOR,

New York State Coll. of Agriculture and Life Sciences, Ithaca. Div. of Atmospheric Sciences. For primary bibliographic entry see Field 7B. W75-06501

EMPIRICAL ESTIMATES OF THE STANDARD TIME-AVERAGED CLIMATIC

Center for Atmospheric Research. National Boulder, Colo.

For primary bibliographic entry see Field 7C. W75_06503

FREQUENCIES OF SHORT-PERIOD RAIN-FALL RATES ALONG LINES, Illinois State Water Survey, Urbana.

A. L. Sims, and D. M. A. Jones.

Journal of Applied Meteorology, Vol 14, No 2, p 170-174, March 1975. 4 fig, 6 ref. AFCRL Contract F 19628-69-C-0070 and F 19628-72-C-0052.

*Precipitation(Atmospheric), *Frequency curves, Rainfall, Rates, Precipitation Meteorology, Climatology, Rain gages, Instru-mentation, Radio communications systems, Precipitation gages, *Florida, *Illinois. Identifiers: Thunderstorm Project.

Two-minute rainfall rates were measured along lines of recording raingages in Florida and Illinois. Knowledge of the frequencies of occurrence of short-duration rainfall rates is needed for estimating attenuation of radio communications and radars. Rainfall rate frequencies are also useful in estimating the erosion of high-speed devices by rain. Results were presented for one summer of data taken at each location. The Florida lines were 9.6 and 21.5 km in length and the Illinois lines 23.9 and 62.2 km. These line frequencies were com-pared with single gage frequencies at each loca-tion. The frequencies by which various rates are exceeded were shown for those that occur more than 0.001% of the time. Rain at rates greater than 0.1 mm/hr occurred less than 6% of the time at either location and for the longest line lengths. For similar line lengths, most rainfall rates have higher frequencies of occurrence in Florida than in Illinois. The rainfall rate frequencies were not significantly different for differing line orientations. W75-06504

SPECTRAL REPRESENTATION OF MOISTURE,

Atmospheric Environment Service, Montreal (Quebec). For primary bibliographic entry see Field 7C. W75-06505

THE USE OF A VERTICALLY POINTING PULSED DOPPLER RADAR IN CLOUD PHYSICS AND WEATHER MODIFICATION STUDIES.

Washington Univ., Seattle. Dept. of Atmospheric

For primary bibliographic entry see Field 3B. W75-06507

PREDICTION AND MEASUREMENT OF THE ACCELERATED MOTION OF WATER DROPS

National Center for Atmospheric Research,

National Center for Atthospheric Research, Boulder, Colo. J. D. Sartor, and C. E. Abbott. Journal of Applied Meteorology, Vol 14, No 2, p 232-239, March 1975. 4 fig, 3 tab, 15 ref.

Descriptors: *Cloud physics, *Fluid mechanics, *Drops(Fluids), Numerical analysis, Drag, Movement, Turbulence, Analytical techniques, Measurement, Reynolds number, Equations,

Identifiers: Acceleration, Drag coefficients, Navier-Stokes equation, Water drops, *Cloud droplets. The lack of detailed information of the drag forces

of cloud droplets during accelerated motion has made it necessary to assume that steady-state drag forces can be used to predict their motion at all times. This assumption is made implicitly in the calculations of collision efficiencies of cloud droplets even though theory and experiment demonstrate that drops accelerate while hydrodynamically interacting. Interaction of droplets in turbulent motion should be particularly sensitive to discrepancies between accelerated drag and steady state. The motion of small water drops (Reynolds number R approximately less than 5) accelerating from rest in a still air chamber was observed. The drag coefficients of the ac-celerated motion of small droplets, obtained in this manner, were compared with observations of steady-state drag coefficients and were found to agree within experimental error. Using the steadystate drag coefficients obtained by Le Clair et al. from wind tunnel studies and numerical solutions to the Navier-Stokes equation of motion, the equations of motion (R approximately less than 5) for accelerating and decelerating drops were analytically integrated to obtain analytic prediction equations for their velocity and position as functions of time. Calculations from these equations were compared with observations and found to agree within experimental error, usually much less than 10%. (Jones-ISWS) W75-06508

SUMMER ICE CRYSTAL PRECIPITATION AT

THE SOUTH POLE, State Univ. of New York, Albany. Atmospheric Sciences Research Center. For primary bibliographic entry see Field 2C. W75-06509

DUAL DOPPLER RADAR COORDINATION USING NOMOGRAMS, Oklahoma Univ., Norman. Dept. of Meteorology.

G. M. Heymsfield.

Journal of Applied Meteorology, Vol 14, No 2, p 257-259, March 1975. 4 fig, 2 ref. NSF Grant GA-

Descriptors: *Radar, *Remote sensing, *Storms, *Oklahoma, Data collections, Equations.
Identifiers: Nomograms, *Dual doppler radar.

A simple nomogram technique to facilitate dual Doppler radar data collection was presented. ations and nomograms were developed for relating the position of a given target relative to two radars. The results were general, but applica-tion was made to the National Severe Storms Laboratory radars at Norman and the Cimarron site 40 km northwest of Norman. (Sims-ISWS)

RELATING RAINFALL RATE TO THE SLOPE OF RAINDROP SIZE SPECTRA, National Hurricane Research Lab., Coral Gables,

Fla. F. J. Merceret.

Journal of Applied Meteorology, Vol 14, No 2, p 259-260, March 1975. 2 tab, 6 ref.

Descriptors: *Raindrops, *Regression analysis, Least squares method, Tropical regions, Precipita-tion(Atmospheric), Florida, Rainfall, On-site data collections, Clouds, Storms, Hurricanes, Distribution patterns.
Identifiers: *Raindrop spectra, *Marshall-Palmer

Tropical raindrop spectra were collected for several years by using airborne foil impactors in tropical cloud-lines, storms, and hurricanes. These data confirm the applicability of the exponential Marshall-Palmer distribution above ground in the of the Marshall-Palmer equation for lambda, the slope term of the distribution, but only if lambda is computed from an intercept-constrained, leastsquares fit to the drop-size distribution data. For spectra constraining N sub 0 to the classical value, the relation between lambda and R is close to the classical one. (Sims-ISWS) WAVE-INDUCED INSTABILITIES IN AN AT-MOSPHERE NEAR SATURATION,

Cooperative Inst. for Research in Environmental Sciences, Boulder, Colo.

F. Einaudi, and D. P. Lalas. Journal of the Atmospheric Sciences, Vol 32, No 3, p 536-547, March 1975. 6 fig, 29 ref. NSF Grants GA-32604 and GA-40243.

Descriptors: *Computer models, *Mathematical models, *Cloud physics, *Gravity waves, Model studies, Atmosphere, Moisture content, Stability, Numerical analysis, Raindrops, Precipita-tion(Atmospheric), Latent heat, Saturation, Atmospheric physics.

The stability and the propagation characteristics of internal gravity waves that propagate in an atmosphere near saturation and, over some height range, create the appropriate thermodynamic con-ditions for condensation to occur for a fraction of the wave cycle are investigated. It was shown that if the atmosphere, over some height range, is close enough to saturation, a linear stability analysis is possible and results in a modified Richardson criterion, based on a new Brunt-Vaisala frequency, n sub ave, smaller than the corresponding n ub u with condensation effects neglected. Since (n sub ave) squared can become negative, even though the atmosphere is originally statically stable, the ability of gravity waves to trigger convective processes in a moist atmosphere was demonstrated. A numerical example was presented to illustrate the alterations of the characteristics of propagation. (Sims-ISWS) W75-06512

ON PARAMETERIZATION OF TURBULENT TRANSPORT IN CUMULUS CLOUDS.

National Oceanic and Atmospheric Administration, Coral Gables, Fla. Experimental Meteorology Lab. W. R. Cotton.

Journal of the Atmospheric Sciences, Vol 32, No 3, p 548-564, March 1975. 13 fig, 1 tab, 33 ref, 1 ap-

Descriptors: *Computer models, *Mathematical models, *Air circulation, *Cloud physics, Model studies, Convection, Condensation, Clouds, Thunderstorms, Precipitation(Atmospheric), En-*Turbulence, Atmosphere, Moisture

content, Eddies, Viscosity.
Identifiers: Liquid water content, Cumulus clouds, Turbulent transport.

A one-dimensional time-dependent cumulus model was developed and discussed. Data predicted by the model along with a bulk entrainment model were compared with a case study observation and Warner's mean profile of Q/Q sub A. While a great deal of the discrepancy between observed and pre-dicted data could be attributed to the transient nature of convection, the consistent pattern of overprediction of such cloud properties as Q/Q/ sub A and vertical velocity was indeed disturbing. It was concluded that neither the entrainment model nor the scalar nonlinear eddy viscosity model can adequately treat the general problem of turbulent transport in convective clouds. There was, however, sufficient evidence suggesting that the models can be of practical value if their use is limited to dynamically active clouds and, in the case of the entrainment model, to a restricted portion of the cloud cycle life. Furthermore, there was little doubt that the entrainment coefficient is not a universal constant while the universality of the mixing length coefficients in the eddy viscosity models is still in question. (Sims-ISWS) W75-06513

SIMPLE STATISTICAL TREATMENT OF HIGHLY TURBULENT COUETTE FLOW,

National Center for Atmospheric Research, Boulder, Colo. P. D. Thompson.

Journal of the Atmospheric Sciences, Vol 32, No 3, p 569-576, March 1975. 5 fig, 2 ref.

Descriptors: *Statistical methods, *Boundary lavers, *Atmospheric physics, *Momentum layers, *Atmospheric physics, *Momentum transfer, *Turbulent flow, Reynolds number, Laboratory tests, Mathematical models, Velocity, Kinetics, Drag. Identifiers: Couette flow.

From the integral conditions for momentum and kinetic energy balance in the state of fully developed turbulence, it was found possible to estimate the bulk statistical properties of highly turbulent Couette flow as functions of the Reynolds number. The average boundary shear, boundary layer thickness, and average momentum transport through the 'constant flux' layer were determined to within the value of a single nondimensional constant. The conclusions of this analysis were in quantitative agreement with laboratory measurements and were consistent with empirical formulas for the Reynolds stress over smooth surfaces. The significance of the results was discussed with specific reference to the problem of 'parameterizing' the statistical effects of turbulent momentum transport in terms of the large-scale average motion of the atmosphere. (Sims-ISWS) W75-06514

RECOMBINATION LIMITS ON CHARGE SEPARATION BY HYDROMETEORS IN CLOUDS.

New Mexico Inst. of Mining and Technology, Socorro

C. B. Moore. Journal of the Atmospheric Sciences, Vol 32, No 3, p 608-612, March 1975. 2 fig, 7 ref. NSF Grant GI-33372 X.

*Thunderstorms. *Electricity, Descriptors: Clouds, Meteorology, Hail, Raindrops, Precipita-tion(Atmospheric), New Mexico, Atmosphere, Electrical properties, Cloud physics. Identifiers: Charge separation, Cloud droplets, *Hydrometeors, Charge transport, Space charge.

Several of the modern hypotheses that explain thundercloud electrification by charge transfers between particles in clouds do so by ignoring any recombination effects in subsequent interactions of the products of earlier charge separations. As this approach is unrealistic, solutions of the con-tinuity relations for the concentrations of the neutral and of the charged cloud droplets were provided. These show that the concentrations of developed charged droplets are probably appreciably less than estimated in the hypotheses volving precipitation. Similarly, as shown by Col-gate, recombination also limits the charge carried downward by falling hydrometeors. Accordingly, the sustained charge-separating ability of sedimenting precipitation is open to question. (Sims-ISWS) W75-06515

REPRESENTATIVENESS OF WATERSHED PRECIPITATION SAMPLES, Univ., Morgantown. Virginia

Research Inst.

M. Chang, and R. Lee.
Available from the National Technical Informa tion Service, Springfield, Va 22161 as PB-241 058, \$4.25 in paper copy, \$2.25 in microfiche. Water Research Institute Bulletin 4, 1975. 46 p. 12 fig., 12 tab., 39 ref. (WRI-WVU-75-01). OWRT A-020tab, 39 WVA(5).

Descriptors: *Local precipitation, *Topography, *Terrain analysis, *Gaging stations, *Spatial distribution, *Watersheds(Basins), *Statistical models, Sampling, Winds, Sites, Hydrologic data, Climatology, *West Virginia, Appalachian moun-Identifiers: Representativeness, Precipitation

Group 2B—Precipitation

The representativeness of precipitation samples was investigated by examining the influences of topography and exposure in watersheds east and west of the Appalachian divide in West Virginia. The confusion between accuracy and representativeness was removed by evaluating gage errors as a function of directional wind speed during precipitation periods. Annual gage errors, in the network of 88 unshielded 8-inch gages, reduced the catch by about 5% of the observed mean. Elevation, and a geographic variable, accounted (statistically) for 60% of the spatial variability of precipitation. Small-scale terrain and slope neters increased the predictability to about 75%. The inclusion of site and gage parameters in the covariance model raised the level of predictability to 90% both east and west of the divide, with standard errors 1.99 inches (east) and 2.07 inches (west). Representative values for each of the statistical parameters were estimated by independent analyses. The estimated true mean watershed precipitation was about 7.6 inches (21%) greater an the observed station mean (east), and about 5.3 inches (12%) greater (west). W75-06522

CALCULATION OF SUPERSATURATION PROFILES IN THERMAL DIFFUSION CLOUD

Clarkson Coll. of Technology, Potsdam, N.Y. Dept. of Chemical Engineering; and Clarkson Coll. of Technology, Potsdam, N.Y. Inst. of Colloid and Surface Science.

J. L. Katz, and P. Mirable.

Journal of the Atmospheric Sciences, Vol 32, No 3, p 646-652, March 1975. 1 fig, 12 ref, 1 append. NSF Grant GK-34914.

Descriptors: "Supersaturation, "Profiles, Meteorology, Nucleation, "Temperature, Pressure, Vapor pressure, Laboratory equipment, Laboratory tests, Equipment, Diffusion. Identifiers: "Thermal diffusion cloud chambers, "Cloud chambers,"

The maximum supersaturation in a diffusion cloud chamber as a function of the temperature difference between the two plates was calculated under various conditions. It was shown that the assumption of linear profiles for the temperature and vapor pressure is a very good one, and that the effect of thermal diffusion is negligible for a wateriar mixture. An appendix contains a listing of a Fortran program used in the calculations. (Sims-ISWS)

MESOSCALE OBJECTIVE ANALYSIS OF THE WIND AND MOISTURE FIELD AROUND THE THUNDERSTORMS DEVELOPED OVER NSSL OBSERVATION NETWORK ON MAY 28, 1967, Meteorological Research Inst., Tokyo (Japan). K. Ninomiva.

Papers in Meteorology and Geophysics, Vol 25, No 2, p 81-97, June 1974. 12 fig. 3 tab, 14 ref.

Descriptors: *Thunderstorms, *Winds, *Moisture, Atmosphere, *Oklahoma, Analysis, Storms, Onsite data collections, Discharge(Water), Temperature, Humidity, Water vapor, Meteorology, *Networks.

Identifiers: *Mesosystem, Mesoscale, Convergence, Diffluence, NSSL network.

A mesoscale objective analysis of the wind and moisture field around the thunderstorms which developed over the NSSL observation network on May 28, 1967, was made. The scheme of the objective analysis included the 'time to space conversion' of the observation relative to the mesosystems. The weighting function for the interpolation depends on both the distance between grid point and observation and the time difference between observation and analysis time. The distributions of wind and moisture obtained by the present analysis coincide fairly well with that ob-

tained by subjective analysis. The morphological description of the change in the environmental situation of the thunderstorms was also attempted on the basis of the obtained wind and moisture field. The convergence line, which is formed along the northern boundary of the predominant lowlevel southerly winds, is simultaneously intensified with the thunderstorms' development. While the middle tropospheric wind field is not modified by the thunderstorms' development, a remarkable ange of winds is found at the 250-mb level, where the upper outflow from the storms modifies the flow into a strong diffluence flow pattern. The analysis of the moisture field indicated that the storms' development is associated with the increase of moisture convergence in the lower layer. (Iones-ISWS) W75-06535

SEA SALT PARTICLES TRANSPORTED TO THE LAND,

Hokkaido Univ., Sapporo (Japan). Dept. of Chemistry. For primary bibliographic entry see Field 5B. W75-06541

COULEE ALIGNMENT AND THE WIND IN SOUTHERN ALBERTA, CANADA, Lethbridge Univ. (Alberta). Dept. of Geography. For primary bibliographic entry see Field 2J. W75-06543

RAIN--A WATER RESOURCE. Department of the Interior, Washington, D.C. For primary bibliographic entry see Field 3B. W75-06586

AGRICULTURAL RESEARCH SERVICE PRECIPITATION FACILITIES AND RELATED

STUDIES, Agricultural Research Service, Washington, D.C. D. M. Hershfield.

Soil and Water Conservation Research Division, Report ARS41-176, June 1971. 117 p, 37 tab, 48 fig, 73 ref.

Descriptors: *Rainfall, *Precipitation(Atmospheric), *Rainfall disposition, *Depth-area curves, *Rainfall intensity, Meteorology, Hydrologic cycle, On-site data collections, Rain. Identifiers: *Rainfall distribution patterns.

The collection of current precipitation studies are primarily aimed at providing information about precipitation pertinent to research on the hydrology of specific agricultural watersheds. Although temporal and spatial variations of precipitation are obtained primarily from rural areas, the findings from the networks can also be taken as indicative of precipitation in urban settings, except for large metropolitan areas where local conditions may cause unique patterns. Researchers in the field of watershed hydrology realize that further develop-ment of this discipline will require the improve-ment of both observation and prediction methods. These studies were collected from 16 places in the United States. Specific objectives in these areas to study watershed hydrology include: (1) developing methods of evaluating rainfall; (2) determining frequency of storms and expectancies of amount and areal extent; (3) determining pertinent characteristics of rainfall with respect to runoff and sediment movement; (4) gaining a better understanding of the role of these areas and the influences of vegetation, climate and land management on the movement of water and sediment; (5) making hydrolic studies of surface and subsurface flows; and, (6) establishing rain gage networks to mea-sure temporal and areal variations in precipitation, obtain basic data for rainfall variability over small areas, and to study depth-area relationships. W75-06657

POTAMOLOGICAL STUDIES ON THE RIVER INA OF THE RIVER SYSTEM OF YODO: 1 (IN JAPANESE).

Osaka Kyoiku Univ. (Japan). Oceanography Lab. For primary bibliographic entry see Field 5B. W75-06701

DRAINAGE DENSITY AND EFFECTIVE PRECIPITATION,

Sri Lanka Univ., Peradeniya. Dept. of Geography. For primary bibliographic entry see Field 4A. W75-06704

ALMOST-PERIODIC, STOCHASTIC PROCESS OF LONG-RANGE CLIMATIC CHANGES,

Colorado State Univ., Fort Collins. W. Q. Chin, and V. Yevjevich.

Scientific Series No. 39, 69 p, 1974, Environment Canada, Inland Waters Directorate, Ottawa, Canada. 61 fig, 83 ref.

Descriptors: *Climates, *Stochastic processes, *Mathematical studies, Research and development, Analytical techniques, Mathematics, Model studies, Mathematical models, Statistical models, Methodology, Analysis. Identifiers: *Climatic change, Research.

A mathematical procedure for quantitative evaluation of long-term climatic changes as an almostperiodic stochastic process is described. The procedure relies on two basic hypotheses: (1) that long-term climatic changes are reflected in the fluctuations of the Oxygen-18 content measured in carbonate shells from deep-sea sediment cores and in the ice core from the Greenland ice sheet, and (2) that long-term almost-periodic variation in the distribution of incoming solar radiation at the top of the earth's atmosphere, as derived from the Milankovich theory of orbital and axial motions of the earth, is the basic deterministic process affecting long-term climatic changes. The background information necessary for a general appreciation of the nature of the oxygen-isotope data and the probable cause and effect of the Milankovich mechanism are outlined. The results show that the problems of long-term climatic changes are amenable to analyses and syntheses by a deterministic-stochastic approach, with the deter-ministic component being almost-periodic. Deter-ministic-stochastic models of several Oxygen-18 time series are presented. Parameters of the models have been estimated from which the generation of new samples of the process can be nade. (Environment Canada)

2C. Snow, Ice, and Frost

W75-06412

AIRBORNE GAMMA RADIATION SURVEYS FOR SNOW WATER-EQUIVALENT RESEARCH-PROGRESS REPORT 1973, EG and G, Inc., Las Vegas, Nev. Las Vegas Div. For primary bibliographic entry see Field 5A. W75-06411

WATER EQUIVALENT OF SNOW DATA FROM AIRBORNE GAMMA RADIATION SURVEYS THE INTERNATIONAL FIELD YEAR FOR THE GREAT LAKES, EG and G, Inc., Las Vegas, Nev. Las Vegas Div. For primary bibliographic entry see Field 5A.

PORE WATER EXPULSION DURING FREEZ-

ING, Hardy (R.M.) and Associates, Calgary (Alberta). For primary bibliographic entry see Field 2G. W75-06435

CARBON DIOXIDE PARTIAL PRESSURES IN ARCTIC SURFACE WATERS, Alaska Univ., College. Forest Soils Lab For primary bibliographic entry see Field 2H. W75-06442

SUMMER ICE CRYSTAL PRECIPITATION AT THE SOUTH POLE, State Univ. of New York, Albany. Atmospheric

Sciences Research Center.

A. W. Hogan. Journal of Applied Meteorology, Vol 14, No 2, p 246-249, March 1975. 4 fig, 4 ref.

*Crystals, *Ice, Descriptors: Precipitation(Atmospheric), *Antarctic, diosondes, Moisture, Clouds, Supersaturation, Meteorology.
Identifiers: *South Pole, Cirrus clouds.

Ice crystal precipitation was observed and the is replicated, at the South Pole during January and February 1974. The crystals were of columnar form. These columns were hollow or prismatic, and sometimes were in the form of com-binations of bullets. These combinations were very fragile, disintegrating into individual bullets upon impaction. Smaller 'diamond dust' crystals were observed on two occasions. NOAA-NWS radiosonde data showed that the air was supersaturated with respect to ice at 650 to 600 mb (i.e., just above the surface) throughout the period. Ice crystal precipitation was only observed at the surface when cirrus bands were present at higher altitudes. It is likely that ice crystals, descending from the cirrus only a short distance above, grew to the larger columnar crystals while falling through the moist layer. As these layers were able to remain saturated, without precipitating or forming ice fogs or clouds at temperatures of -35c, heterogeneous freezing nuclei were probably absent at these levels throughout the period. (Jones-ISWS) 775-06509

OBSERVATIONS OF POTENTIAL ICE NUCLEI. Meteorological Research Inst., Tokyo (Japan).

For primary bibliographic entry see Field 3B. W75-06536

PHOTOGRAMMETRIC DETERMINATION OF RELATIVE SNOW AREA, Colorado State Univ., Fort Collins.

A. H. Barnes.
U.S. Forest Service, Rocky Mountain Forest and Range Experiment Station, June 1970. 14 p, 3 fig, 3

Descriptors: *Snow surveys, *Snow cover, *Snow management, *Photogrammetry, *Computer models, Computer simulation, Computer pro-

A photogrammetric and computer procedure for A photogramment and computer processor the evaluation of relative snow cover in a limited area of a drainage basin was developed. The primary goal was to provide a more precise and accurate evaluation than previously used. An additional benefit was to reduce the time required for each determination. The observational and compu tational procedures were based on several simpli-fying assumptions. Future applications of the basic procedure could include the effect of these assumptions. The photogrammetric principle, computational and measurement procedures are detailed in the report. A computer program was developed to accept the data as presented on the punch cards, identify the type of area (total area, gross snow area, or bare area within the gross snow area) compute the area, compute the percent snow, and output the significant values. The results of this limited evaluation indicate that the procedure can be used for the determination of ercentage snow cover. The accuracy and precision of the procedure could be improved by consideration of several additional factors. These factors affect either the operator or the computations. No attempt was made to evaluate this procedure with other methods in use. These comparisons were considered outside the scope of this study. W75-06670

DISTRIBUTION OF ISOTOPES IN SOME NATURAL WATERS IN THE REGION NORTH OF MT. JOLMO LUNGMA. For primary bibliographic entry see Field 2K.

DETERMINATION OF THE MASS BALANCE ON SENTINEL GLACIER, BRITISH COLUM-BIA, CANADA,

of the Environment, Ottawa Department (Ontario). Water Resources Branch. O. Mokievsky-Zuboc.

Scientific Series No. 30, 35 p, 1973, Inland Waters Directorate, 9 fig. 11 ref. 6 tab.

Descriptors: *Photogrammetry, *Ablation, *Volumetric analysis, Glaciology, Water balance, Analytical techniques, Melting, Meltwater, Estimating, Methodology, Measurement, *Canada. Identifiers: *Sentinel Glacier, *Mass balance, British Columbia, Retreat.

Mass balance for Sentinel Glacier was determined for the period 1966-1971. Two surface measurement methods were used for the entire glacier; terrestrial photogrammetry was used for the tongue area. Surface balance methods were compared to establish the degree of internal consistency and the magnitude of possible error. The terrestrial photogrammetry method gave the surface lowering of the exposed ice; changes in its elevation compared with surface ablation measurements gave the vertical component of ice flow for the lower part of the glacier. Sentinel Glacier showed four years with a positive mass balance and two years with a negative mass balance. The total loss, however, exceeded gain by 28 cm of water for the entire surface of the glacier. (Environment Canada) W75-06732

ICE PILING ON LAKESHORES - WITH SPE CIAL REFERENCE TO THE OCCURRENCES ON LAKE SIMCOE IN THE SPRING OF 1973, Canada Centre for Inland Waters, Burlington (Ontario)

G. Tsang Scientific Series No. 35, 12 p, 1974, Inland Waters Directorate. 15 fig. 4 ref.

Descriptors: *Lake ice, *Iced lakes, Analysis, Analytical techniques, Mathematics, Equations, Mathematical studies, Lakes, Meteorology, Damages, *Canada. Identifiers: *Ice piling, *Ice floes, *Lake Simcoe.

The piling of ice on lakeshores was studied. Ice piling is not a static but a dynamic event. Ice piling occurs when ice floes, which gather speed and mo mentum under the action of wind over an openwater fetch, ram onto the shore or onto shorefastened ice. The kinetic energy of the ice floes is converted into the potential energy of the ice piles. A strong wind is not necessary for ice piling. Ice piles will occur under a wind of less than 6.75 m/s if other conditions are favorable. Meteorologically, a shift in wind direction from offsh onshore is a necessary condition for ice piling. The fluctuation of wind strength and direction and the shifting of wind help to loosen the ice floes and te ice piling. Ice piling occurs in above freezing temperatures only. Equations are derived treezing temperatures only. Equations are cerved that give the width of an openwater fetch required for ice piling, the speed of the ice floes for ice pil-ing, the height of an ice pile, and the affecting fac-tors. It is proposed that damage to shoreline properties may be avoided by accelerating the piling of ice at a distance offshore. Field data from the ice pilings on Lake Simcoe in the spring of 1973 are used in the study. (Environment Canada) W75-06733

ANALYSIS OF MASS BALANCE VALUES AND THEIR ACCURACY FOR SENTINEL GLACIER. BRITISH COLUMBIA, CANADA,

Department of the Environment, (Ontario). Water Resources Branch. O. Mokievsky-Zubok

Scientific Series No. 31, 4 p, 1974, Inland Waters Directorate. 12 ref, 2 fig, 1 tab.

Descriptors: *Measurement, Methodology, Volumetric analysis, Ice, Firn, Ablation, Analytical techniques, Glaciology, *Canada.

Identifiers: *Sentinel Glacier(BC), *Mass balance, British Columbia.

The accuracy of mass balance measurements for Sentinel Glacier was determined by comparison of (1) a method, based on determination of difference between measured winter and summer balances with (2) an alternate method, the difference between the volume of remaining snow cover and ice and firn ablation. The difference ranged from 0.2% to 8.8% as related to the thickness of the snow cover. The greatest difference was obtained for deeper snowpacks. Both methods provide acceptable results but, Method 1 is considered less accurate. (Environment Canada) W75-06740

STUDY OF SENTINEL GLACIER, BRITISH COLUMBIA, CANADA WITHIN THE INTER-NATIONAL HYDROLOGICAL DECADE PRO-**GRAM - PROCEDURES AND TECHNIQUES,** Department of the Environment, (Ontario). Water Resources Branch.

O. Mokievsky-Zuboc. Technical Bulletin No. 77, 31 p, 1973, Inland Waters Directorate. 21 fig, 15 ref, 1 tab, 2 append.

*Glaciology, Descriptors: *Glaciers. *Investigations, *Surveys, International Hydrological Decade, Field work techniques, History, Equipment, Data collections, Ice, Measure-ment, Analytical techniques, *Canada. Identifiers: *Sentinel Glacier, Data collection techniques, On-site investigations, British Colum-

Sentinel Glacier, considered to be representative of many glaciers in the Mount Garibaldi area of British Columbia, is one of the glaciers studied as part of the Canadian contribution to the International Hydrological Decade (IHD) program. Situated in a maritime climate and subject to high winter precipitation, it presents many problems in obtaining the mass balance. Field work techniques and problems are discussed. (Environment Canada) W75-06741

NEW BRUNSWICK FLOOD, APRIL-MAY 1973. Environmental Protection Service, Halifax (Nova Scotia). Atlantic Region. For primary bibliographic entry see Field 4A. W75-06749

2D. Evaporation and Transpiration

COMPARED EVAPOTRANSPIRATION VARIOUS CROPS AND STUDY OF WATER-CONSUMPTION RATES,

Institut National de la Recherche Agronomique, Toulouse (France). Station d'Agronomie. J. Puech, and M. Hernandez. Ann Agron (Paris). Vol 24, No 4, p 437-455, 1973,

Illus (In French)

Group 2D-Evaporation and Transpiration

Identifiers: Crops, *Evapotranspiration, Fescue, Maize, Rates, Sorghum, Soya, Sunflower, Transpiration, *Consumptive use.

Maximum and actual evapotranspiration (ETM and ETR, respectively) of various crops (maize, sorghum, sunflower, soya, fescue) were compared and measured using evapotranspirometers and the neutron method. The water-consumption conditions of these crops in terms of climatic factors (measured potential evapotranspiration of reed fescue) was investigated, including the development of the ETM/ETR ratio in terms of the varieties of plants, soils, pedoclimatic factors, and the increasing contribution of the water reserves in the plants. The law of linear variation of the yield in terms of the ETR/ETM ratio was consistent. In some late-maturing plants, e.g., maize, sunflower, soya, the ETP measured with reed fescue was, over a given period, definitely increased.--Copyright 1974, Biological Abstracts, Inc. W75-06728

A SENSITIVE RECORDING LYSIMETER.

Agricultural Research Inst., Cedara (South Africa).

R. Mottram, and J. M. De Jager.

Agrochemophysica. Vol 5, No 1, p 9-13, 1973,

Identifiers: Evapotranspiration, *Lysimeters, Transpiration, Instrumentation.

An economical and sensitive lysimeter for evaluating hourly water usage of crops was designed, con-structed and tested. A cylindrical steel lysimeter of surface area 2.5457 sq m and soil depth of 0.4 rests on a mechanical balance system, having a resolution of 1 in 10,000. A precision strain gauge load beam of 0.1% accuracy and 20 kg capacity is incorporated in the balance lever system, and its output recorded on a galvanometric strip chart recorder. The complete system provides measurement of evapotranspiration to within 0.1 mm of water .-- Copyright 1974, Biological Abstracts, Inc. W75-06729

2E. Streamflow and Runoff

DEVELOPMENT OF A STORM RUN-OFF PRE-DICTION MODEL WITH SIMULATED TEMPORAL RAINFALL DISTRIBUTION. Meteorological Office, New Delhi (India)

D. V. L. N. Rao, D. C. Mantan, and S. C. Hasija. Nordic Hydrology, Vol 5, No 4, p 193-212, 1974. 10 fig, 5 tab, 5 ref.

Descriptors: *Excessive precipitation, *Rainfallrunoff relationship, *Hyetographs, *Hydrographs, Antecedent precipitation, Runoff, Precipitation(Atmospheric), Foreign countries, Asia, Foreign research, Unit hydrographs, Storm runoff, Surface runoff, Streamflow, Model studies, *Storm runoff, Precipitation excess

Identifiers: *India(Yamuna Basin), Storm index, Antecedent precipitation index, Phi-index, Initial

The Yamuna catchment up to Kalanur was studied. The representative character of limited pluviograph data was determined with the use of the storm index concept. After establishing a relationship between the limited pluviograph data and areal rainfall data, the possible effects of areal rainfall variation of the use of limited data were studied. A simulated temporal rainfall pattern for the area was then worked out and applied in the unit graph analysis, which led to the development of interesting relationships between rainfall intensity, antecedent precipitation index (API), and Phi-index, and the API-initial loss relationships. These two put together gave rise to a reasonable peak trend prediction diagram for the Yamuna catchment up to Kalanur. (Lee-ISWS) W75-06453

ADAPTATION AND APPLICATION OF THE KARAZEV METHOD TO THE RATIONALIZA-TION OF QUEBEC'S HYDROMETRIC BASIC NETWORK, National Inst. of Scientific Research, Quebec.

M. Leclerc, B. Bobee, and J. P. Villeneuve. Nordic Hydrology, Vol 5, No 4, p 213-228, 1974. 3 fig. 3 tab. 3 ref.

Descriptors: *Hydrologic data, *Regional analysis, *Average runoff, *Networks, *Hydrometry, Stream-flow, *Canada, Surface waters, Regime Runoff, Network design, Stations, Synoptic analysis, Gaging, Spatial Watersheds(Basins), Stream gages. distribution, Identifiers: Quebec, *Karazev method, Rationalized method

Certain principles inherent to the rational development of hydrometric networks were applied to the Quebec network. An application of a method specific to the development of a basic network was described. The method used to establish the number of stations required was based on the actual knowledge of the spatial distribution and time variability of the mean annual runoff. A modified version of Karazev's (1968) method, applied originally to a study of the hydrographic basins in the USSR, was found to be particularly suitable to regions of little hydrologic information and particularly to Quebec. (Lee-ISWS) W75-06454

COMPARISON OF HYDROLOGIC AND HYDRAULIC CATCHMENT ROUTING PROCEDURES.

University Coll., Galway (Ireland). J. W. Porter.

Journal of Hydrology, Vol 24, No 3/4, p 333-349, February 1975. 8 fig, 1 tab, 12 ref.

Descriptors: *Simulation analysis, *Mathematical models, *Routing, *Rainfall-runoff relationships, Hydrology, Hydrologic systems, Hyetographs, Travel time, Time lag, Time of concentration, Watersheds(Basins), Hydraulics, *Australia. Identifiers: *Catchment response, New South Wales, *Kinematic waves,

A comparative study of two nonlinear catchment routing techniques was presented. One technique was founded on hydrologic concepts of distributed storage, the other on hydraulic concepts of kinematic wave theory. Previously published data for storms recorded on the catchment of South Creek in New South Wales. Australia, were used. The hydrologic technique used was a modification of Laurensen's technique. The hydraulic technique was as formulated by Wooding. (Terstriep-ISWS)

RELATIONS BETWEEN PLANIMETRIC AND HYPSOMETRIC VARIABLES IN THIRD- AND FOURTH-ORDER DRAINAGE BASINS.

New Univ. of Ulster, Coleraine (Northern Ireland). School of Biological and Environmental For primary bibliographic entry see Field 2A.

W75-06459

W75-06481

FLOODWAY DETERMINATION USING COM-PUTER PROGRAM HEC-2, Hydrologic Engineering Center, Davis, Calif. For primary bibliographic entry see Field 7C.

APPLICATION OF THE HEC-2 BRIDGE ROU-

TINES, Hydrologic Engineering Center, Davis, Calif. For primary bibliographic entry see Field 7C. W75-06482

SHALLOW LAMINAR FLOWS OVER ROUGH

SHALLOW LAMINAR FLOWS OVER ROUGH GRANULAR SURFACES, University of the West Indies, St. Augustine (Trinidad). Dept. of Civil Engineering. For primary bibliographic entry see Field 8B. W75-06532

OF URBANIZATION ON EFFECTS CATCHMENT RESPONSE,

Puerto Rico Univ., Mayaquez. Dept. of Civil En-

Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 101, No HY3, Proceedings Paper 11196, p 451-466, March 1975. 12 fig, 6 tab, 14 ref, 2 append.

Descriptors: *Hydraulics, Hydrology, *Simulation analysis, *Rainfall-runoff relationships, Mathematical models, Hyetographs, Urban drainage, Urban hydrology, Urban runoff, *Urbanization, *Puerto Rico, Urban renewal. Identifiers: *Kinematic waves.

A mathematical model was utilized as an experimental tool to perform a series of controlled ex-periments on small hypothetical catchments characteristic of areas in Puerto Rico. The purpose of the experiments was to quantify the likely efof typical urban developments on hydrologic response characteristics of the hypothetical catchments, and to relate these effects to the separate physical changes introduced by urbanization. An important modeling issue also was investigated. Initially a very detailed model of the catchments was employed thus providing a fine spatial resolution but at relatively high cost. A simple scheme was developed in which the detailed model may be replaced by a much coarser and less expensive mathematical model with no ificant loss of accuracy. (Terstriep-ISWS) W75-06534

FLOW SEPARATION IN MEANDER BENDS, Leeds Univ. (England). Dept. of Earth Sciences. M. R. Leeder, and P. H. Bridges. Nature, Vol 253, No 5490, p 338-339, January 31, 1975. 3 fig. 11 ref.

*Flow separation, *Meanders, Descriptors: *Froude number, *Deposition(Sediments), *River beds, River flow, Eddies, Sediment transport, Vortices, Erosion, Velocity, Tidal streams, Onsite investigations.
Identifiers: Point bars, Bedforms, Scotland.

The occurrence of flow separation in natural meanders was investigated in channels from the intertidal zone of Solway Firth, Scotland. Flow separation in meander bends was experssed as a function of bend tightness and Froude number. The effects of flow separation were found to be:
(1) decreased effective channel width and increased velocity and erosion rate along the outer bank, and (2) rapid deposition of suspended sedi-ment in the inner part of the separation zone. An empirical criterion for predicting the onset of separation in meander bends was proposed. (Adams-ISWS) W75-06539

CONFIDENCE LIMITS FOR DESIGN EVENTS, Department of the Environment, Ottawa (Ontario). Water Resources Branch. G. W. Kite. Water Resources Research, Vol 11, No 1, p 48-53, February 1975. 1 fig, 5 tab, 13 ref.

Descriptors: *Design flow, *Frequency analysis, Descriptors: "Design flow, "Frequency analysis, Probability, "Statistical methods, Hydrology, "Design criteria, Distribution, Distribution pat-terns, Variability, Frequency, Statistical models, Statistics, Data processing, Analytical techniques, Identifiers: Sample mean, Population mean, Stan-dard deviation, Coefficient of skew, Random variables. Castida, Chica Variation, Variation, Coefficient of Skew, Random variations, Coefficient of Skew, Coefficient of Skew, Random variations, Coefficient of Skew, C ables, Confidence limit, Variance, Log normal.

Streamflow and Runoff—Group 2E

Frequency analysis is commonly used in hydrology to define flood plains, design hydraulic struc-tures, and aid in watershed planning and management. Although design event magnitudes may be determined analytically by using probability distributions, the analytical determination of cofidence limits for the design event is not easy. Using the alternate method of moments to determine the determination of the design of the des mine confidence limits involves an assumption of normality of the distribution of design events. It was shown by data generation that this assumption is valid for quite small samples. Tables were given to compute confidence limits in this manner for several common probability distributions. (Dawes-W75-06544

BIRTH-DEATH MODELS FOR DIFFERENTIAL

PERSISTENCE, Harvard Unov., Boston, Mass. Graduate School of Business Administration. B. B. Jackson.

Water Resources Research, Vol 11, No 1, p 75-95, February 1975. 20 fig, 1 tab, 11 ref, 1 append.

Descriptors: *Correlation analysis, *Planning, *Model studies, *Streamflow, *Statistical studies, *Streamflow, methods, Regression analysis, Statistical models, Persistence, Hydrologic systems, Hydrology, Maine, New Hampshire, Vermont, Mas-sachusetts, Statistics, *New England. Identifiers: Serial correlation, Correlation coefficient, Mean, Variance, Standard deviation.

Birth-death models can generate synthetic flow sequences that demonstrate differential persistence, i.e., sequences in which low flows show more persistence than high flows. A simple phenomenological model helped justify the assumption of differential persistence. The use of a birth-death model, together with a set of modeling precepts, showed that differential persistence is a phenomenon of considerable descriptive im-portance but, at least in some planning situations, does not carry corresponding prescriptive importance. (Dawes-ISWS)
W75-06546

MODERNIZATION OF NATIONAL WEATHER SERVICE RIVER FORECASTING TECHNIQUES,

National Weather Service, Silver Spring, Md. For primary bibliographic entry see Field 4A. W75-06562

FORECASTING SNOWMELT RUNOFF IN THE UPPER MIDWEST,
Minnesota Univ., Minneapolis. Dept. of Civil and

Mineral Engineering. For primary bibliographic entry see Field 2A. W75-06648

CHENANGO RIVER, FLOOD PLAIN INFOR-MATION.

Army Engineer District, Baltimore, Md. Broome County Legislature, Binghampton, New York, October, 1971. 27 p, 7 tab, 11 fig.

Descriptors: *Flood plains, *Flood frequency, *Historic floods, *River flow, *Flood forecasting, *Flood data, Flood profiles, Flood routing, Flood stages, Floods, Flood discharge, New York, Flood

peak, Flood control.
Identifiers: Chenango River, Broome County(New York), Intermediate regional flood, Stan-

The flood situation was analyzed along the Chenango River in the Towns of Chenango and Fenton, Broome County, New York. The informa-tion is based on rainfall, runoff, historical and current flood heights, and other technical data bearing upon the occurence and size of floods in the study area. Two significant phases of the flood problem are covered. First the largest known floods are discussed; second, probable future floods are considered. The report contains maps, profiles, and cross sections which indicate the extent of flooding that has been experienced and that which might occur in the future. This should prove helpful in planning the best use of the flood plains. From the maps, profiles, and cross sections the depth of probable flooding either by recurrence of the largest known floods or by occurrence of the Intermediate Regional or Standard Project Flood at any location may be learned. Plans for the solution of future floods are not included. It is in-tended to provide the basis for further study and planning on the part of local officials, and Broome County, in arriving at solutions to minimize vul-nerability to flood damages. (Poertner)

SUSQUEHANA RIVER, FLOOD PLAIN INFOR-

Army Engineer District, Baltimore, Md. Broome County Legislature, Binghampton, New York, June, 1970. 31 p, 20 fig, 8 tab.

Descriptors: *River flow, *Flood plains, *Flood frequency, *Historic floods, *Flood forecasting, *Flood data, Flood profiles, Flood routing, Flood stages, Floods, Flood discharge, New York, Flood control, Flood peak.

Identifiers: Susquehana River, Broome County(New York), Standard project flood, Intermediate regional flood.

The flood situation was analyzed along the 20-mile section of the Susquehana River in the Towns of Windsor and Colesville in eastern Broome County, New York. The information is based upon rainfall, runoff, historical and recent flood heights, and other technical data bearing upon the occurence and size of floods within the study area. Two significant phases of the flood situation are covered. First, the largest known floods of the past are discussed. Second, the probable future floods are considered. Included are maps, profiles, and selected cross sections which indicate the ex-tent of flooding which might occur in the future within the study area. These materials should prove helpful in planning the best use of the flood plain. From the maps, profiles and cross sections, the depth of probably flooding, either by recurrence of the largest known flood or by occurrence of the Intermediate Regional or Standard Project Floods, at any location may be determined. Plans for the solution of future floods are not included. It is intended to provide the basis for further study and planning on the part of the Broome County Legislature in arriving at solutions to minimize vulnerability to flood damages. (Poertner) W75-06678

SUSQUEHANNA AND CHENANGO RIVERS-FLOOD PLAIN INFORMATION. Army Engineer District, Baltimore, Md.

Broome County Legislature, Binghampton, New York, December, 1969. 55 p, 17 tab, 26 fig.

Descriptors: *Historic floods, *River flow, *Flood plains, *Flood forecasting, *Flood data, *Flood control, Flood profiles, Flood routing, Flood frequency, Flood stages, Floods, Flood discharge, New York, Flood peak. Identifiers: Susquehana River, Chenango River, Broome County(New York).

The flood situation was analyzed along the Susquehanna and Chenango Rivers in Broome County, New York. The information is based on rainfall, runoff, historical and current flood heights, and other technical data bearing upon the occurrence and size of floods. Two significant phases of the flood problem are covered. First, the largest known floods of the past are discussed and second, probable future floods are considered. In-cluded are maps, profiles, and cross sections which indicate the extent of flooding that has been

experienced and that which might occur in the future. This should prove helpful in planning the best use of the flood plains. From the maps, profiles, and cross sections, the depth of probable flooding either by recurrence of the largest known floods or by occurrence of the Intermediate Regional or Standard Project Flood at any location may be learned. Plans for the solution of future flood problems are not included. The information is intended to provide the basis for further study and planning on the part of local officials, and Broome County, in arriving at solutions to minimize vulnerability to flood damages. (Poertner)

PEAK FLOWS BY THE SLOPE-AREA METHOD,

of the Environment, Ottawa Department (Ontario). Water Resources Branch.

A. G. Smith. Technical Bulletin No. 79, 31 p, 1974, Inland Waters Directorate, 13 fig, 8 ref, 5 tab.

Descriptors: *Peak discharge, *Measurement, *Slopes, Streamflow, Networks. Watersheds(Basins), Theoretical analysis, Hydraulics, Surveys, Floods, Flood data, Network design, Computer programs, *Canada. Identifiers: *Slope-area method, Quesnel River, Regional studies, Columbia Basin.

Stream discharges are usually measured by the current meter method. During floods, however, it is frequently impossible or impractical to measure discharges by this means. Many peak discharges must be determined after the passage of the flood indirect methods, such as the slope-area method. The indirect method of determining peak discharge is based on hydraulic equations, which relate the discharge to the water-surface profile and the geometry of the channel. A field survey is made to determine the water surface profile and the channel characteristics for a series of discharge measurements over a suitable range of stage. Values of the coefficient of roughness and the channel conveyance are calculated as a basis for computing the flood discharge. Detailed descriptions of the general procedures used in collecting field data and in computing discharge are given. The study for the Quesnel River, Station 08KH006, is used to illustrate the field and office procedures used in calculating peak flows. (Environment Canada)

NEW BRUNSWICK FLOOD, APRIL-MAY 1973. Environmental Protection Service, Halifax (Nova Scotia). Atlantic Region. For primary bibliographic entry see Field 4A. W75-06749

FLOOD STAGES AND DISCHARGES FOR SMALL STREAMS IN TEXAS, 1972, Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 4A. W75-06754

FLOOD HAZARD ANALYSES: FOX RUN, STARK AND WAYNE COUNTIES, OHIO.

Soil Conservation Service, Columbus, Ohio.
Prepared with Ohio Department of Natural
Resources and Stark County, Ohio, February 1974. 7 p, 10 plates, 1 tab.

Descriptors: *Floods, *Flooding, *Flood profile, *Flood forecasting, Floodwater, Flood plain, *Ohio. Flood data. Identifiers: *Fox Run(Ohio), 100-year flood, Stark County(Ohio), Wayne County(Ohio).

Fox Run, flowing eastward through Little Fox Lake in Wayne County on into Stark County where it joins the Tuscarawas River, drains 14.2 square miles. Established as a legal ditch in 1904, it

Group 2E-Streamflow and Runoff

had been improved in 1968 by the Stark County Engineer and the Wayne Soil and Water Conservation District. Current use of gently sloping land is agricultural. Projections to 1990 estimate 65% of the area will be single family homes of 1/2 to 1 acre with the majority in Lawrence Township (Stark County). Flood projections indicate 225 acres (including stream channel and adjacent floodways) would be inundated by a 100-year flood which could reach an elevation as much as 6 feet over present low bank readings in some areas. Fox Run below Clays Park Lake is subject to backwater flooding from the Tuscarawas River. Comparable data are given for floods of 50 and 25 year intervals but these water surface elevations vary little from the 100-year flood. Plates show the extent of floods. This information is intended as a technical base for future local flood plain management decisions. (Park-North Carolina)

2F. Groundwater

HYDROLOGIC CHARACTERISTICS RESPONSE OF FRACTURED TILL AND CLAY
CONFINING A SHALLOW AQUIFER,
Waterloo Univ. (Ontario). Dept. of Earth

G. E. Grisak, and J. A. Cherry. Canadian Geotechnical Journal, Vol 12, No 1, p 23-43, February 1975. 10 fig, 4 tab, 41 ref.

Descriptors: Hydrologic properties, *Fracture permeability, *Aquifer characteristics, *Aquitards, *Flow systems, Confined water, Aquifer system, Storage coefficient, Hydraulic conductivity, Groundwater movement, Porous media, Mathematical studies, Finite element analysis, Model studies, Steady flow, *Canada, Pumping, Tritium, Tracers, Flow nets.

Identifiers: Manitoba, *Fractured tills, Compression indices.

Fractures in glacial till and glaciolacustrine clay were observed in excavations up to 20 ft in depth and in drill cores in southeastern Manitoba. The fractures are characteristically coated with carbonate and oxide precipitates, which indicate groundwater movement through the fractures. The fractures impart an effective bulk hydraulic conductivity to the clay as evidenced by tritium tracer experiments and piezometer responses in the till and clay to pumping of an underlying sandy aquifer. The intergranular hydraulic conductivity of clay-loam till and glaciolacustrine clay in the Interior Plains, as determined from laboratory consolidation test data, is in the range 2 x 10 to the solidation test data, is in the range 2×10 to the minus 10th power to 9×10 to the minus 11th power ft/s. The bulk hydraulic conductivity of the fractured clay-loam till at the study site, as determined from finite-element mathematical modeling, is about 6 x 10 to the minus 9th power ft/s. Analysis of piezometer drawdowns during a long-term pumping test indicated that rapid piezometer drawdowns in the confining layers can be ac-counted for by assigning specific storativity values in the range of 0.00001 to 0.000005/ft. (Prickett-ISWS)

A SURROGATE-PARAMETER APPROACH TO MODELING GROUNDWATER BASINS Colorado State Univ., Fort Collins. Dept. of Civil

Engineering.
J. W. Labadie.

Water Resources Bulletin, Vol 11, No 1, p 97-114, February 1975. 5 fig, 13 ref.

Descriptors: *Parametric hydrology, *Mathematical models, *Groundwater basins,
*Aquifer characteristics, Input-output analysis, Equations, Optimization, Hydrogeology, Least squares method, Model studies. Identifers: *Surrogate parameters, *Duality theory, Second-order gradient method, Nonconvex problems, Saddle-points, Lumped parameter

surrogate-parameter approach to modeling groundwater basins was presented, which has the following advantages over current simulation-type methods: (1) conducivness to modeling nonhomogeneous and nonisotropic basins; (2) there is no need to guess boundary conditions if accurate information is not available; (3) the model is amenable to systematic calibration or identification through the use of optimization techniques; and (4) compatibility with systematic algorithms for analyzing a wide range of management strategies. Since the parameter identification problem is large-scale and nonconvex, it was decomposed through application of generalized duality theory into several sub-problems of smaller size which were solved independently a number of times in order to achieve an overall solution. Results were presented for a hypothetical system of four interacting wells. (Visocky-ISWS) W75-06449

NATURAL SOIL NITRATE: THE CAUSE OF THE NITRATE CONTAMINATION OF GROUND WATER IN RUNNELS COUNTY.

TEXAS, Texas Univ., Austin. Bureau of Economic Geolo-

For primary bibliographic entry see Field 5B. W75-06452

OXYGEN AND SULFUR ISOTOPIC COMPOSI-TION OF THE SULFATE IONS FROM MINERAL AND THERMAL GROUNDWATERS OF POLAND.

Comitato Nazionale per le Ricerche Nucleari, Pisa (Italy). Laboratorio di Geologia Nucleare. For primary bibliographic entry see Field 5A. W75-06455

EFFECT OF SOLUTE DISPERSION ON THER-MAL CONVECTION IN A POROUS MEDIUM

Technion-Israel Inst. of Tech., Haifa. Faculty of Civil Engineering. H. Rubin.

Water Resources Research, Vol 11, No 1, p 154-158, February 1975. 4 fig, 8 ref.

Descriptors: *Solutes, *Dispersion, *Convection, *Temperature, *Porous media, Heat transfer, Mathematical models, Boundaries(Surfaces), Equations, Currents(Water), Groundwater movement, Aquifers, Stratification, Salinity. Identifiers: *Perturbations, Overstability, Cellular

motion, Helical flow, Flow field, Instability, Parameters, Boussinesq approximation, Peclet number, Prandtl number, Rayleigh number,

In some situations associated with geothermal ac-In some situations associated with geothermal activity, groundwater motions are affected by convection currents due to large temperature gradients. In such cases, usually saline hot water is located in the deep layers of the aquifer from which salt and heat are transferred to the upper layers. In part 1 - of this study the parameters of the two-dimensional flow field stability were determined. In part 2, further analysis of the phenomenon in three dimensions was presented. It was found that the convection cells have the shape of rolls whose axes are perpendicular to the steady state flow velocity. However, there is also a possibility of overstability of the flow field caused by rolls whose axes are parallel to the steady state velocity. The parameters of these two kinds of instability were determined. (See W73-13381) (Visocky-ISWS) 75-06494

PUBLIC GROUNDWATER SUPPLIES IN MASON COUNTY,

Illinois State Water Survey, Urbana

For primary bibliographic entry see Field 4B. W75-06527

PUBLIC GROUNDWATER SUPPLIES IN STARK COUNTY, Illinois State Water Survey, Urbana

For primary bibliographic entry see Field 4B. W75-06528

GROUNDWATER SUPPLIES PERRY COUNTY,
Illinois State Water Survey, Urbana

For primary bibliographic entry see Field 4B.

PERMEABILITY AND EFFECTIVE STRESS,

Geological Survey, Menlo Park, Calif. M. D. Zoback, and J. D. Byerlee. American Association of Petroleum Geologists Bulletin, Vol 59, No 1, p 154-158, January 1975. 6

*Sandstones, *Permeability. Descriptors: Effective stress, *Pore pressure, *Soil pressure, Model studies, Compacted soils, Interstices, Pores, Soil physical properties, Pore water, Hydrostatic pressure, *Stress, Overburden, Instrumentation, Reservoirs, Rocks.

Identifiers: Matrix pressure, Tectonic stress, Fluid pressure, Injection pressure, Berea sandstone.

Permeability of the Berea Sandstone was measured as a function of both confining pressure and pore pressure. As expected, permeability decreased with increased confining pressure and increased with increasing pore pressure. However, pore pressure had a significantly larger effect on permeability than did confining pressure. This behavior can be explained if the matrix through which the pore fluid flows has a higher compressibility than the granular framework which supports externally applied stresses. (Prickett-ISWS) W75-06540

A THEORY OF THE COMBINED MOLE-TILE DRAIN SYSTEM,

utah State Univ., Logan. Dept. of Agricultural and Irrigation Engineering. K. Unhanand, and T. N. Kadir.

Water Resources Research, Vol 11, No 1, p 111-119, February 1975. 8 fig, 2 tab, 13 ref. AID/csd-2167

Descriptors: *Mole drainage, *Tile drainage, *Unsteady flow, *Water table, *Equations, Groundwater movement, Theoretical analysis, Groundwater movement, I neoretical analysis, Soils, Drainage, Hydraulic gradient, Mathematical models, Homogeneity, Isotropy, Hydraulic conductivity, Specific yield, Dupuit-Forchheimer theory, Darcys law, Laplaces equation. Identifiers: Spacings.

A theory of water movement in the combined mole-tile drain system based on the transient state condition was developed. Two general equations were derived to describe the height of the water table at any location in the system at any elapsed time after the drainage process begins. One of the equations is applicable for the stage in which the water table is above the mole drains, and the other equation is for the stage in which the water table falls below the mole drains. The two general equations were simplified for the point located at m point between the tile drains and mole drains in the system. In the derivation, assumptions regarding the flow condition of groundwater and shape of the water table profile at certain boundaries were made. Field experiments were then conducted, and the test data were used in verifying the equation for the first stage. A reasonably good agree-ment between the theretical analysis and field data was obtained for this type of research. (Visocky-ISWS)

Water In Soils—Group 2G

DRAINAGE OF GROUNDWATER RESTING ON A SLOPING BED WITH UNIFORM RAINFALL, Agricultural Research Council, Cambridge (England). Unit of Soil Physics. For primary bibliographic entry see Field 4B. W75.06550

PROGRAM SOPH - SIMULATION OF TIME-VARIANT PIEZOMETRIC SURFACE IN A CONFINED AQUIFER SUBJECT TO PUMPING, Department of the Environment, Ottawa (Ontario). Water Resources Branch. For primary bibliographic entry see Field 4B. W75-06737

GROUND-WATER LEVELS AND WELL RECORDS FOR CURRENT OBSERVATION WELLS IN IDAHO, 1922-73, PARTS A, B, AND

Geological Survey, Boise, Idaho. For primary bibliographic entry see Field 4B. W75-06753

GROUND-WATER DATA FOR MICHIGAN, Geological Survey, Lansing, Mich. For primary bibliographic entry see Field 7C. W75-06756

EDWARDS AQUIFER, A STUDY OF EDWARDS RECHARGE ZONE REQUIREMENTS, AACOG WATER QUALITY PLANNING, PHASE 5, Alamo Area Council of Governments, San Antonio, Tex. For primary bibliographic entry see Field 4B.

THE HYDRO-MECHANICS OF THE GROUND WATER SYSTEM IN THE SOUTHERN PORTION OF THE KAIBOB PLATEAU, ARIZONA, Arizona Univ., Tucson.
P. W. Huntoon.

PhD Dissertation, 1970. 247 p, 55 fig, 9 tab, 56 ref.

Descriptors: *Hydrology, *Areal hydrogeology, *Geohydrologic units, Regional analysis, Karst hydrology, Fracture permeability, Groundwater, *Arizona, Colorado River.
Identifiers: *Kaibob Plateau(Ariz), Grand Canvon(Ariz).

The Kaibob Plateau has an area of 880 square miles and lies north of the Grand Canyon of the Colorado River of Arizona. Marine Paleozoic sediments predominantly low permeability make up the 4000 foot sequence. The ground water system is controlled in two ways. The first is a lateral system defined by the stratigraphic sequency which controls forty percent of the plateau surface. It drains the upper 900 feet of section laterally toward fault zones or seep faces on the canyon wall. The fault zones are the second control and provide large capacity conduits both vertically and horizontally serving as flood drains for storm pulses. Fracturing also controls the development of extensive karst networks in limestones near the base of the Paleozoic section. Production from the large fault controlled drainage is also unattractive. Although the occurrence of water is certain, the large supplies are more than 2800 feet deep and exist in finite channels along the fault zone. Conventional drilling methods would be difficult to utilize. (Bradbeer-NWWA)

THE DISTRIBUTION OF MINOR ELEMENTS BETWEEN COEXISTING CALCITE AND DOLOMITE IN THE GASPORT MEMBER OF THE LOCKPORT FORMATION, LOCKPORT, NEW YORK.

NEW YORK, State Univ. of New York, Buffalo. For primary bibliographic entry see Field 2K. W75-06811 HYDROSTRATIGRAPHIC UNITS OF THE SUR-FICIAL DEPOSITS OF EAST-CENTRAL IL-LINOIS.

Illinois Univ., Urbana. J. W. Vukovich. MSc thesis 1967. 52 p, 13 fig, 2 tab, 25 ref.

Surficial glacial deposits are the primary source of water in a region in east-central Illinois, that includes approximately 1200 square miles of counties, including McLean, DeWitt, Macon, Piatt, Ford and Champaign. Maps were made of lithologic or hydrostratigraphic units that would be useful to the future development of the water supply. The stratigraphy had to be worked out in detail. Correlation of the various till units was done by association of physical properties and their relative positions in the stratigraphy. Four units of permeable sand and gravel were defined as aquifers. The thickest was at the greatest depth and the units got progressively thinner upward toward the surface. Data for the stratigraphy were obtained from approximately 470 drillers logs. A differentiation of till sheets was made from the drillers logs. These till sheets are marked by weathered profiles, weathering zones of red-stained rock, and by rubble of till zones in the record. Cross-sections were made, three of which were almost perpendicular to the direction of movement of glaciation which deposited most of the cover in the study area. The sand and gravel distributions are illustrated by four isolithic maps based on the hydrostratigraphic units previously determined. The buried Mahomet Valley runs along the bedrock surface and is filled, in the lowlands, with a sandy aquifer. Each of the hydrostratigraphic units is defined in detail and then distribution patterns are discussed. This study is compared with two recent studies of this area. (Bradbeer-NWWA) W75-06817

2G. Water In Soils

SOIL AS A MEDIUM FOR THE RENOVATION OF ACID MINE DRAINAGE, Pennsylvania State Univ., University Park. Dept.

of Agronomy.
For primary bibliographic entry see Field 5D.
W75-06365

NEW CONCEPTS IN SOIL SURVEY IN-TERPRETATIONS FOR ON-SITE DISPOSAL OF SEPTIC TANK EFFLUENT,

Wisconsin Univ., Madison. Dept. of Soil Science. For primary bibliographic entry see Field 5D. W75-06402

DIFFUSION OF RADIOACTIVE FLUID THROUGH SOIL SURROUNDING A LARGE POWER-REACTOR STATION AFTER A CORE MELTDOWN ACCIDENT, California Univ., Livermore. Lawrence Liver-

more Lab.
For primary bibliographic entry see Field 5B.
W75-06407

PORE WATER EXPULSION DURING FREEZ-ING.

Hardy (R.M.) and Associates, Calgary (Alberta). E.C. McRoberts, and N. R. Morgenstern. Canadian Geotechnical Journal, Vol 12, No 1, p 130-141, February 1975. 6 fig, 3 tab, 15 ref, 1 apnend. Descriptors: "Pore water, "Freezing, "Ice-water interfaces, "Frozen ground, "Porous media, Frost heaving, Soil types, Pore pressure, Saturated flow, Model studies, Finite element analysis; Numerical analysis, Interfaces, Moisture ress, Water storage, Laplaces equation, Analytical techniques, Thermal properties. Identifiers: "Water expulsion.

When a freezing front advances through a saturated soil, water may either by expelled or attracted to the freezing front depending on soil type, stress level, and rate of freezing. Experiment evidence was considered which showed that coarse-grained sandy soils expel water under most conditions while fine grained soils can be made to expel water only at higher overburden pressures. A solution for the excess pore pressures that can be penetrated due to impeded drainage by pore water expulsion in an open system was presented. (Prickett-ISWS)

CONVERGENCE AND VALIDITY OF TIME EX-PANSION SOLUTIONS: A COMPARISON TO EXACT AND APPROXIMATE SOLUTIONS,

Connecticut Agricultural Experiment Station, New Haven. Dept. of Ecology and Climatology. J-Y. Parlange. Soil Science Society of America Proceedings, Vol

Soil Science Society of America Proceedings, Vol 39, No 1, p 3-6, January-February 1975. 1 fig, 12 ref.

Descriptors: "Mathematical studies, "Equations, "Diffusion, Saturated flow, Saturated soils, Porous media, Infiltration, Diffusivity, Boundaries(Surfaces), Absorption.

Identifiers: *Time expansion series, Spherical cavities, Convergence, Delta function solutions.

The convergence of series solutions for the diffusion equation by time expansion was discussed quantitatively, on the basis of the linear and delta function solutions for a spherical cavity. It was shown that convergence alone is a poor criterion to justify the validity of the series solutions. A counter example, diffusion in the presence of an impervious wall, showed that the series may converge for all times but be entirely erroneous. By comparison, an approximate integral technique yields a solution which agrees very well with the exact result. (Visocky-ISWS)

EFFECT OF APPLICATION RATE, INITIAL SOIL WETNESS, AND REDISTRIBUTION TIME ON SALT DISPLACEMENT BY WATER, Punjab Agricultural Univ., Ludhiana (India). Dept.

B. S. Ghuman, S. M. Verma, and S. S. Prihar. Soil Science Society of America Proceedings, Vol 39, No 1, p 7-10, January-February 1975. 7 fig, 1 tab, 6 ref.

Descriptors: *Leaching, *Salts, *Soil moisture, *Infiltration, *Path of pollutants, Groundwater, Water pollution, Chlorides, Soil water movement, Percolation, Distribution patterns, Water distribution(Applied).

Identifiers: Salt spread, Salt peak, *Salt movement, Salt displacement.

Certain concepts regarding the displacement and profile-spread of surface-salts with applied water and the leaching efficiency of applied water were experimentally verified with soil columns. Treatments included different amounts and rates of water application and different initial soil water contents. Salt and water profiles were determined by destructive sampling in 2-cm depth intervals after variable times of redistribution. Salt front coincided with the water front in the initially dry soil and lagged behind it in the initially moist soil. Salt peak immediately after infiltration and after redistribution, for all initial soil water contents, occurred at a depth above which total water

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storage equaled infiltration. But the salt spread in the profile increased as the initial water content in-creased. Immediately following infiltration, salt was displaced deeper with slower than with faster rates of water application. But when the applica-tion plus redistribution time was matched, the salt showed deeper movement with water added at faster than at slower rates. These results show that slower rates of water application may not increase the leaching efficiency of water under field condi-tions. (Sanderson-ISWS) W75-06437

DETERMINATION OF SOIL WATER DIF-FUSIVITY BY SORPTIVITY MEASUREMENTS, Agricultural Research Service, Riverside, Calif. Salinity Lab. C. Dirksen.

Soil Science Society of America Proceedings, Vol 39, No 1, p 22-27, January-February 1975. 6 fig. 2

Descriptors: *Soil moisture, *Moisture content, *Diffusion, *Absorption, *Hydraulic conductivity, Soil physical properties, Unsaturated flow, Soil water movement, Sorption, Numerical analysis, Soil water, Diffusivity.

A new method was proposed for determining the dependence of soil water diffusivity and conductivity on water content or pressure head in the teneter range. A weighted mean diffusivity is used to linearize the one-dimensional absorption problem. The resulting cumulative absorption is equated to that of the exact nonlinear solution to obtain an expression for the diffusivity in terms of sorptivity. To use this result, sorptivities must be measured for a series of step-function increases in the water content (pressure head) at the absorption interface. Such sorptivity measurements are quickly and easily made in situ. The method was tested on a numerical example with nearly perfect results. Also, sorptivity measurements were made on laboratory soil columns and the derived hydraulic conductivities compared well with those measured directly under steady state conditions. W75-06438

INFLUENCE OF SOIL MICROSTRUCTURE ON WATER CHARACTERISTICS OF SELECTED HAWAIIAN SOILS,

Hawaii Agricultural Experiment Station, Honolu-

G. Y. Tsuji, R. T. Watanabe, and W. S. Sakai. Soil Science Society of America Proceedings, Vol 39, No 1, p 28-33, January-February 1975. 7 fig, 2 tab, 12 ref. 211(d) Grant AID/csd-2833.

Descriptors: *Soil structure, *Soil physical properties, "Soil water, "Electronic equipment, Temperature, Retention, Soil texture, "Hawaii, Bulk density, Anisotropy, Montmorillonite, Kaolinite. Identifiers: Scanning electron microscope, *Pore-size distribution, Oxisols, Ultisols, Vertisols, Inceptisols.

The higher water-holding capacity of Oxisols and Ultisols compared to that of the Vertisols and Inceptisols at 15 bars of suction was attributed to the presence of intraaggregate void spaces. Existence of such voids was verified with the aid of a scanning electron microscope. These voids were obvious in soils with kaolinitic and oxidic mineralogy but were not evident in soils of mont-morillonitic or amorphous oxide composition. (Schict-ISWS) W75-06439

LANDFORM-SOIL-VEGETATION-WATER CHEMISTRY RELATIONSHIPS, WRIGLEY AREA, N.W.T.: II. CHEMICAL, PHYSICAL, AND MINERALOGICAL DETERMINATIONS AND RELATIONSHIPS, British Columbia Univ., Vancouver. Department

of Soil Science.

M. E. Walmsley, and L. M. Lavkulich. Soil Science Society of America Proceedings, Vol 39, No 1, p 89-93, January-February 1975. 3 tab. 18

Descriptors: *Soil-water-plant relationships, *Water chemistry, *Mineralogy, *Permafrost, *Canada, Geomorphology, Alpine, Grasslands, Colluvium, Bogs, Lakes, Streams, Soil formation, Clay minerals, Ice, Physical properties. Identifiers: *Mackenzie Valley(Northwest Territories), Cryoturbation, Catenary sequence, Stone stripes, Stone rings, Coalescing fans, Polygonal hopes.

The relationship among five landforms in terms of chemical, physical, mineralogical, and water chemistry of lakes and the through flowing streams was presented. The landforms occur as a catenary sequence (toposequence) in the intermit-tent permafrost region of the Mackenzie Valley, Northwest Territories, Canada. The five land-forms were identified as an alpine meadow, an area of stone stripe and stone ring formation, a colluvial slope, an area of coalescing fans, and an area of polygonal bog formation. Information colarea of polygonal og formation, information con-lected on the chemical quality of a stream flowing through the area included pH, O2, Ca, Mg, Na, K, Cl, F and NO3. Chemical, physical, and mineralogical analyses of the soils occurring on these landforms illustrated the effect of climate on soil genesis. Cryoturbic action is the dominant soil genesis. Cryoturoic action is the dominant process occurring in the stone stripe area while ice segregation is predominant in the area of polygonal bog formation. The limited decomposition of the soil organic matter is related to the harsh climate. Subdued pedogenic development of soils in the coalescing fan area is evident by their youthful profile differentiation. Water chemistry demonstrated the functional and integrated effect between dissolved load in the water and the landform through which the stream has flown. (Visocky-ISWS)
W75-06440

A NEW CERAMIC CUP SOIL-WATER SAM-

Forest Service (USDA), La Crosse, Wis.

A. R. Harris, and E. A. Hansen.

Soil Science Society of America Proceedings, Vol 39, No 1, p 157-158, January-February 1975. 1 fig.

Descriptors: *Soil water, *Water sampling, *Instrumentation, Sampling, Water pollution. Identifiers: *Porous ceramic cup, *Water sampler.

A newly designed soil-water sampler utilizing a miniature porous ceramic cup was suitable for either collecting large samples or for microtechniques. It eliminated sample transfer in the field and contamination from water channeling along sampler, and can be enclosed to discourage vandalism. It also permitted immediate preserva-tion of the collected sample. (Schicht-ISWS) W75-06441

EFFECT OF SOIL WATER POTENTIAL ON DISEASE INCIDENCE AND OOSPORE GER-MINATION OF PYTHIUM APHA-NIDERMATUM,

Arizona Univ., Tucson. Dept. of Plant Pathology. M. E. Stanghellini, and T. J. Burr. Phytopathology. Vol 63, No 12, p 1496-1498, 1973,

*Soil water, Descriptors: Moisture uptake, *Germination, Plant growth, Alfalfa, *Plant diseases, Effects.

Identifiers: Pythium-aphanidermatum, Oospores, Spores.

Oospores of P. aphanidermatum germinated directly in asparagine-amended soils maintained at soil moisture levels ranging from saturation to -15

bars matric water potential. Percentage oospore germination and germ-tube growth rates were reduced at the lower soil moisture levels. reduced at the lower soil moisture levels. Colonization of alfalfa seeds, sown in soil containing a natural population of 80 viable oospores of P. aphanidermatum/g soil, occurred at all soil moisture levels except -15 bars matric potential. Wet soil conditions favor the activity of Pythium by increasing nutrient availability for oospore germination.—Copyright 1974, Biological Abstracts, Isc. W75-06447

EFFLUENT FOR IRRIGATION - A NEED FOR

Illinois State Water Survey, Urbana. For primary bibliographic entry see Field 5D. W75-06451

IN SITU SOIL WATER HOLDING CAPACITIES OF SELECTED NORTH DAKOTA SOILS North Dakota State Univ., Fargo. Dept. of Soils. D. K. Cassel, and M. D. Sweeney. Bulletin 495, 25 p, 7 fig, 3 tab, 18 ref.

Descriptors: *North Dakota, *Soil water, *Soil types, *Storage capacity, *Retention, Field capacity, Soil properties, Soil physical properties, Vegetation effects, Topsoil, Soil moisture, Soil texture, Bearing strength, Subsurface waters, Onsite investigations.

Bulk density, particle size distribution (percent sand, silt, and clay), soil water characteristic, and in-situ field capacity were measured for each of 28 sites representing 26 soil types. Natural variation of all measured parameters was evident within a given soil series. Measured variation in in-situ field given soil series. Measured variation in in-situ field capacity for replicate sites of a given soil type ranged from three to five percentage units. No consistent relationship was observed between the measured in-situ field capacity and field capacity estimated by using 1/10 and 1/3 atmosphere pressure plate apparatus, irrespective of soil texture. For coarse to moderately coarse textured soils, in-situ field capacity was nearly always greater or less than the 1/10 atmosphere pressure plate extractor values, but tarely ever as low as the 1/3 atmosphere values. For medium to moderately fine textured soils, in-situ field capacity was either textured soils, in-situ field capacity was either greater than or less than the 1/3 atmosphere value but did not exceed the water content at 1/10 atmosphere. (Sims-ISWS) W75-06469

IMPLEMENTATION PACKAGE FOR A DRAINAGE BLANKET IN HIGHWAY PAVE-MENT SYSTEMS,

Pederal Highway Administration, Washington, D.C., Implementation Div. For primary bibliographic entry see Field 4C. W75-06470

EFFECT OF SOLUTE DISPERSION ON THER-MAL CONVECTION IN A POROUS MEDIUM Technion-Israel Inst. of Tech., Haifa. Faculty of

Civil Engineering.
For primary bibliographic entry see Field 2F.

PREDICTION OF SEEPAGE THROUGH CLAY SOIL LININGS IN REAL ESTATE LAKES, Arizona Water Resources Research Center, Tuc-For primary bibliographic entry see Field 4A. W75-06516

LAND TREATMENT OF MENHADEN WASTE WATER BY OVERLAND FLOW,
Louisiana State Univ., Baton Rouge. Dept. of Marine Science.
For primary bibliographic entry see Field 5D.

W75-06526

A THEORY OF THE COMBINED MOLE-TILE DRAIN SYSTEM.

Utah State Univ., Logan. Dept. of Agricultural and Irrigation Engineering. For primary bibliographic entry see Field 2F. W75-06547

ESTIMATING INFILTRATION FOR ERRATIC

RAINFALL, Oak Ridge National Lab., Tenn

Oak Ridge National Lab., 1em.
M. Reeves, and E. E. Miller.
Water Resources Research, Vol 11, No 1, p 102110, February 1975. 14 fig, 1 tab, 11 ref, 2 append. NSF AG-199, 40-193-69.

Descriptors: *Infiltration, *Rainfall intensity, *Soil water movement, *Mathematical models, *Rainfall intensity. *Estimating, Groundwater movement, *Rainfall runoff relationships, Runoff, Seepage, Simulated rainfall, Soil water, Infiltration rates, Hysteresis, Soil physical properties, Precipitation intensity, Hydrology, Watersheds(Basins), Storms.
Identifiers: Erratic rainfall, Cumulative infiltration. Soil crust.

To cheaply estimate the infiltration/runoff of typically unsteady rainfall events for purposes of watershed modeling, a method known as 'time compression' was tested against hysteretic Darcy computations. This method assumes that for a given soil the maximum infiltration rate is simply a function of the cumulative infiltration, regardless of the rainfall versus time history. The appraisal proved generally encouraging for application of this approximation to watershed modeling. The maximum infiltration rate was uniformly underestimated to a moderate degree in the early minutes of a downpour commencing late in an un-steady event. (Prickett-ISWS) W75-06548

WATER TABLE POSITION AS AFFECTED BY

SOIL AIR PRESSURE, Agricultural Research Service, Reno, Nev For primary bibliographic entry see Field 4B. W75-06549

DEPTH DISTRIBUTIONS OF GLOBAL FAL-LOUT SR90, CS137, AND PU239, 240 IN SANDY

Health and Safety Lab. (AEC), New York. For primary bibliographic entry see Field 5A. W75-06795

REGIONAL UNIFORMITY OF CUMULATIVE RADIONUCLIDE FALLOUT, Health and Safety Lab. (AEC), New York For primary bibliographic entry see Field 5A. W75-06819

POROUS CERAMIC SOIL MOISTURE SAM-PLERS, AN APPLICATION IN LYSIMETER STUDIES ON EFFLUENT SPRAY IRRIGATION, Department of Agriculture, Lethbridge (Alberta).

Research Station

R. G. Bell. NZJ Exp Agric, Vol 2 No 2 p 173-175, 1974. Illus. Identifiers: Clays, Effluents, E-coli, Irrigation, *Lysimeters, Sampling, Soils, Yellow, *Soil moisture samplers, *Spray irrigation.

Porous ceramic soil moisture samplers were installed at 3 depths within a packed lysimeter. No leachate was produced, as the bottom 50 cm of the reachate was produced, as the bottom 30 cm of the soil column was impervious yellow clay. Soil moisture samples were readily obtained from the porous ceramic samplers. The non-entry of the test organism Escherichia coli into the 1-bar sam-plers in the presence of clay suggests that cuch a sampling system cannot be usefully applied to studies requiring enumeration of the soil microflora or organisms intorduced by a soil-applied effluent, but can readily be applied to the study of mobile chemical substances.--Copyright 1974, Biological Abstracts, Inc. W75-06843

2H. Lakes

PHYTOPLANKTON POPULATIONS IN RELA-TION TO DIFFERENT TROPHIC LEVELS AT WINNIPESAUKEE LAKE, NEW HAMPSHIRE,

New Hampshire Univ., Durham. Dept. of Botany. For primary bibliographic entry see Field 5C. W75-06354

POPULATION DYNAMICS, BIOLOGY AND ESTIMATION OF PRODUCTION IN BENTHIC MOLLUSCA OF LAKE CHAD, (IN FRENCH), Ecole Normale Superieure, Paris (France). Laboratoire de Zoologie. For primary bibliographic entry see Field 2I. W75-06360

THE EFFECTS OF ENVIRONMENTAL STRESS ON THE COMMUNITY STRUCTURE AND PRODUCTIVITY OF SALT MARSH EPIPHYTIC COMMUNITIES: PROGRESS REPORT. City Coll., New York.

For primary bibliographic entry see Field 5C. W75-06383

WIND-BLOWN DUST AS A SOURCE OF NUTRIENTS FOR AQUATIC PLANTS, Canterbury Univ., Christchurch (New Zealand). Dept. of Zoology. C. L. McLay. Environ Pollut. Vol 5, No 3, p 173-180, 1973, Illus.

Descriptors: *Dusts, *Aquatic plants, Leaves, *Plant growth, Nutrients, Lakes.

Identifiers: Lemna-perpusilla, Scirpus-californicus, Duckweed.

The importance of natural and man-made dust accumulated on plant leaves, to the plant itself and to the surrounding vegetation, was investigated. The response of Lemna perpusilla to dust washed from the stems of Scirpus californicus which grows with the duckweed is reported. Duckweed growth was stimulated by the washings, and growth was stimulated by dust that accumulated on a concrete wall near the lake. Dust from both sources produced an immediate growth response by duckweed and probably contained soluble nutrients. Salts leached from the Scirpus stems may have been partially responsible for the increase in growth, and the utilization of nutrients from this source by aquatic plants may represent a previously unsuspected pathway in the nutrient cycle of a lake.--Copyright 1974, Biological Abstracts, Inc. W75-06406

AIRBORNE GAMMA RADIATION SURVEYS FOR SNOW WATER-EQUIVALENT RESEARCH-PROGRESS REPORT 1973, EG and G, Inc., Las Vegas, Nev. Las Vegas Div. For primary bibliographic entry see Field 5A. W75-06411

WATER EQUIVALENT OF SNOW DATA FROM AIRBORNE GAMMA RADIATION SURVEYS -INTERNATIONAL FIELD YEAR FOR THE

GREAT LAKES, EG and G, Inc., Las Vegas, Nev. Las Vegas Div. For primary bibliographic entry see Field 5A. W75-06412

EFFECTS OF SELECTED HERBICIDES ON BACTERIAL POPULATIONS IN FRESH AND TREATED WATER,

Clemson Univ., S.C. Dept. of Botany. For primary bibliographic entry see Field 5C. W75-06432

CARBON DIOXIDE PARTIAL PRESSURES IN ARCTIC SURFACE WATERS, Alaska Univ., College. Forest Soils Lab.

P. I. Coyne, and J. J. Kelley.

Limnology and Oceanography, Vol 19, No 6, p 928-938, November 1974. 4 fig, 3 tab, 13 ref. DA-ENG-27021072-G33 and GV29343.

Descriptors: *Carbon dioxide, Water properties, *Pressure, *Instrumentation, *Alaska, Gases, Analytical techniques, Photosynthesis, Chemistry, Estimating, On-site tests, Physical properties, Vapor pressure, Cold regions, Supersaturation, Arctic, Surface waters, Atmosphere, Air-earth in-terfaces, Wind velocity, Water temperature, Sediments, Seasonal, Decomposing organic matter. Identifiers: Partial pressures, *Infrared gas analysis, Evasion coefficient.

Seasonal changes in the CO2 partial pressure (PCO2) regime for an arctic freshwater pond and lake near Barrow, Alaska, were measured by infrared gas analysis by determining the CO2 concentration of air in equilibrium with the water. These waters were generally supersaturated in CO2 with respect to air throughout the period of open water and constitute a CO2 source to the arctic atmosphere. Meltwater standing on the bottomfast ice of the lake in spring and water beneath the newly formed ice in fall also had CO2 partial pressures greater than ambient air. The seasonal mean CO2 partial pressure gradient between the water and the ambient air was 397 + or - 185 ppm for the pond and 115 + or - 83 ppm for the lake. PCO2 was inversely related to wind speed and water tem-perature but directly related to sediment temperature. Evasion rate coefficients calculated for the lake, based on in situ rate experiments, indicated an average transfer of 0.34 + or - 0.17 mg CO2/sq cm/atm/min to the atmosphere. (Henley-ISWS) W75-06442

WIND STRESS ON NEARSHORE AND LAGOONAL WATERS OF A TROPICAL

ISLAND, Louisiana State Univ., Baton Rouge. Coastal Studies Inst.

For primary bibliographic entry see Field 2L.

TEMPERATURE EFFECTS ON GREAT LAKES

WATER BALANCE STUDIES, State Univ. of New York, Buffalo. Dept. of Civil Engineering. D. D. Meredith.

Water Resources Bulletin, Vol 11, No 1, p 60-68, February 1975. 2 tab, 26 ref.

Descriptors: *Water temperature, *Great Lakes, Water balance, Thermal expansion, Hydrology, Water level recorders, Precipitation(Atmospheric), Evaporation, Runoff, Groundwater, Analysis, Temperature, Profiles, Surface

The Great Lakes constitute the earth's greatest expanse of fresh water and therefore represent an important natural resource. Because of the amount of precipitation on each lake, the amount of evaporation from the lake and the amount of surface runoff into the lake are difficult to determine. Management studies consider only the net basin supply, but such studies could be as much as 100% wrong because of temperature effects. Estimates were made of beginning-of-month water tempera-ture profiles for each lake by using the cited litera-ture. These water temperature profiles along with surface water temperatures were used to deter-

Group 2H-Lakes

mine the effects of thermal expansion and contraction of water on the net basin supply values obtained from water balance studies that used end-of-month lake levels. Although the effect on lake levels was small, the effect on the net basin supply varied from zero for some months up to the same order of magnitude as the net basin supply value for that month. It was concluded that the thermal expansion and contraction of water should be considered when computing net basin supply values for each lake even though the effect on lake levels is small. (Roberts-ISWS) W75-06448

GREAT LAKES WATER QUALITY, ANNUAL REPORT TO THE INTERNATIONAL JOINT COMMISSION, (1973).

International Joint Commission-United States and Canada. Great Lakes Water Quality Board. For primary bibliographic entry see Field 5B. W75-06474

SKYLAB STUDY OF WATER QUALITY. Kansas Univ., Lawrence. For primary bibliographic entry see Field 5A. W75-06478

PREDICTION OF SEEPAGE THROUGH CLAY SOIL LININGS IN REAL ESTATE LAKES, Arizona Water Resources Research Center, Tuc-

For primary bibliographic entry see Field 4A. W75-06516

A LIMNOLOGICAL STUDY OF SILVERWOOD LAKE: IMPACT OF WATER TRANSPORT ON WATER QUALITY.

California State Polytechnic Univ., Pomona For primary bibliographic entry see Field 5A. W75-06538

BIOLOGICAL, CHEMICAL AND RELATED ENGINEERING PROBLEMS IN LARGE ENGINEERING PROBLEMS IN STORAGE LAKES OF TASMANIA, Hydro-Electric Commission,

(Australia). Civil Engineering Div. For primary bibliographic entry see Field 4A W75-06556

LAKE RESTORATION

PROCEDURES, Colorado Univ., Boulder. For primary bibliographic entry see Field 5G. W75-06566

LONG-TERM RECONSTRUCTION OF WATER LEVEL CHANGES FOR LAKE ATHABASCA BY ANALYSIS OF TREE RINGS,

Arizona Univ., Tucson. Lab. of Tree-Ring Research. For primary bibliographic entry see Field 4A. W75-06569

NUMERICAL MODELING OF THERMAL STRATIFICATION IN A RESERVOIR WITH LARGE DISCHARGE-TO-VOLUME RATIO, Tennessee Valley Authority, Muscle Shoals, Ala.

Air Quality Branch. G. G. Park, and P. S. Schmidt.

Water Resources Bulletin, Vol 9, No 5, p 932-941, October 1973. 4 fig, 1 tab, 7 ref.

Descriptors: *Reservoirs, *Thermal stratification, *Lakes, *Water quality control, *Temperature, *Simulation analysis, *Texas, Behavior, Inflow, Outflow, Meteorological data, Flow, Effects, Eplimnion, Hypolimnion, Thermocline, Water resources, Planning, Depth, Convection, Diffusion, Southwest U.S., *Forecasting, Identifiers: *Lyndon B. Johnson Lake(Texas), Sensitivity, Colorado River(Tex).

Thermal stratification in fresh-water reservoirs is a concern in water resources planning because of the strong dependence of many key chemical and biological parameters on temperature. In the southwestern United States, even relatively shallow reservoirs often exhibit significant stratification due to the long and intense warming period; Lake Lyndon B. Johnson, of primary concern in this study, typifies the characteristics of many reservoirs in this region. Described is a numerical model study of thermal stratification in a high discharge-to-volume reservoir. Predicted temperature profiles are compared with field data for two different years. The model accurately predicts the data of fall turnover and predicts degree of stratification and depth of the thermocline within about 20% for both years simulated. A parametric study of stratification mechanics for a high flow reservoir has indicated that diffusion was the predominant heat transport mechanism in the hypolim-nion, while surface effects dominated the epilimnion. Flow effects for the particular case studied, in which all inflows and outflows occur in the epilimnion, did not significantly affect stratification behavior. (Bell-Cornell) W75-06572

WHITE BEAR LAKE CONSERVATION DIS-TRICT (AS AMENDED).

For primary bibliographic entry see Field 6E. W75-06603

FACTORS LIMITING PRIMARY PRODUCTIVI-TY IN TURBID KANSAS RESERVOIRS, Kansas Water Resources Research Inst.. Manhattan.

For primary bibliographic entry see Field 5C. W75-06642

PHYTOPLANKTON OF THE WESTERN (KURTLI) POND IN 1967-1970 (IN RUSSIAN), Acad. Sci. Turkm. SSR, Ashkhabad, Inst. Bot. For primary bibliographic entry see Field 5C. W75-06653

RESULTS OF TESTING CLEAN-FLO LAKE CLEANSER IN FLORIDA LAKES, Florida State Game and Fresh Water Fish Com-

mission, Lake City; and Clean-Flo Labs., Inc., Hopkins, Minn. For primary bibliographic entry see Field 5D. W75-06672

ON THE USE OF INDICATOR COMMUNITIES OF TUBIFICIDAE AND SOME LUMBRICU-LIDAE IN THE ASSESSMENT OF WATER POL-LUTION IN SWEDISH LAKES,

Uppsala Univ. (Sweden). Inst. of Zoology. For primary bibliographic entry see Field 5C. W75-06698

COMPARATIVE STUDY OF THE NITROGEN LIFE-CYCLE IN THE PONDS (IN FRENCH), Station d'Hydrobiologie Continentale, Biarritz

For primary bibliographic entry see Field 5C. W75-06702

DIURNAL VARIATION IN SAGAR LAKE, SAGAR (INDIA): I. STUDIES IN THE DEEP WATER AREA,

Saugar Univ., Sagar (India). Dept. of Botany. For primary bibliographic entry see Field 5C. W75-06705

PHYTOPLANKTON IN THE OLIGOHALINE LAKE, SELSO: PRIMARY PRODUCTION AND

STANDING CROP, Copenhagen Univ. (Denmark). Institut for Thallophyta. For primary bibliographic entry see Field 5C.

W75-06708

LIFE IN A LAKE RESERVOIR: FEWER OP-TIONS, DECREASED PRODUCTION, Institute of Freshwater Research Drottningholm (Sweden).

For primary bibliographic entry see Field 5C. W75-06712

COMPARISON OF FRESH-WATER PROTOZOAN COMMUNITIES IN GEO-GRAPHICALLY PROXIMATE BUT CHEMI-CALLY DISSIMILAR BODIES OF WATER,

Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology. W. H. Yongue, Jr., J. Cairns, Jr., and H. Boatin,

Arch Protistenkd. Vol 115, No 2/3, p 154-161, 1973. Illus.

Identifiers: Bogs, *Michigan, *Ponds, *Protozoa, Hydrogen ion concentration, *Water hardness.

Twenty-eight protoxoan-free polyurethane foam substrates were placed in 2 ponds, about 100 m apart (Michigan), with markedly different pH and hardness. The protozoan species which colonized these substrates were studied 7 times at weekly intervals. Of the 202 spp. identified from the bog pond (pH 5.8-6.0, hardness 17.1-34.2 ppm) 112 occurred in more than I weekly harvest (or sa pling). Of the 176 spp. from the pit pond (pH 8.0-9.0, hardness 102-154 ppm) 110 were recurring. Thirteen species were present continuously in both ponds from weeks 3 through 7 and 8 spp. occurred 50% or more of the time in one pond and did not appear at all in the other. Possible explantations for these similarities and differences are discussed.--Copyright 1974, Biological Abstracts,

W75-06715

THE BOTTOM FAUNA OF LAKE LILLE-JON-SVANN, TRONDELAG, NORWAY, Kongelige Norske Videnskabers Selskab, Trond-

For primary bibliographic entry see Field 5B. W75-06716

THE BOTTOM FAUNA OF LAKE HUDDING-SVATN, BASED ON QUANTITATIVE SAM-

PLING, Kongelige Norske Videnskabers Selskab, Trond-

For primary bibliographic entry see Field 5B. W75-06717

THE EFFECT OF LIGHT INTENSITY ON THE AVAILABILITY OF FOOD ORGANISMS TO SOME LAKE BAIKAL FISHES,

Biologo-Geograficheskii Nauchno-Issledovatelskii Institut, Irkutsk (USSR). . A. Volkova

Vopr Ikhtiol. Vol 13, No 4, p 709-722, 1973, Illus, (In Russian).

Coregonus-autumnalis-migratorius, Identitiers: Coregonus-autumnocome Cottocomephorus-grewingki, Esox-lucius, Fishes, *Food organisms, Lakes, *Light intensity, Paracottus-kessleri, Phoxinus-phoxinus, Paracottus-kessleri, *USSR(Lake Baikal).

Changes in the availability of food organisms as a function of light intensity were studied under ex-perimental conditions with the following Lake Baikal fishes: Coregonus autumnalis migratorius and Cottocomephorus grewingki at various stages of ontogenesis and Paracottus kessleri, Phoxinus phoxinus and Esox lucius. The threshold levels of light intensity, lowest level of light intensity for inlight intensity, lowest level of light intensity for in-tiation of active feeding and maximal intensity of these fish were determined. The role of vision in feeding was also investigated. The availability of food organisms for Baikal fishes of various ecological groups depends on the potential of their receptors and the adaptive characteristics of the behavior in question .- Copyright 1974, Biological Abstracts, Inc.

ICE PILING ON LAKESHORES - WITH SPECIAL REFERENCE TO THE OCCURRENCES ON LAKE SIMCOE IN THE SPRING OF 1973, Canada Centre for Inland Waters, Burlington (Ontario).

For primary bibliographic entry see Field 2C. W75-06733

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SUMMARY REPORT OF MICROBIOLOGICAL BASELINE DATA ON LAKE SUPERIOR, 1973, Canada Centre for Inland Waters, Burlington

S. S. Rao, and J. Henderson.

Scientific Series No. 45, 8 p, 1974, Inland Waters Directorate. 9 fig, 3 ref, 5 tab.

Descriptors: *Lake Superior, *Microbiology, *Surveys, *Data collections, *Bacteria, Water quality, Coliforms, Pathogenic bacteria, Streptococcus, Water pollution, Microorganisms,

From May to November 1973, six Lake-wide cruises were made on Lake Superior to collect bacteriological data to establish baseline bac-teriological levels and to develop criteria for nondegradative water quality standards. Samples were collected from 117 stations from depths of 1 m, 10 m, 50 m and bottom depths. They were immediately analyzed on board ship for total coliform, fecal coliform, fecal streptococcus and heterotrophic bacterial densities. Some monthly trends were observed in the coastal areas. Coliform densities increased throughout the sampling period. Fecal coliform populations fluctuated with peaks in May, July-August and November, and fecal streptococcus population densities decreased slightly from May-November. Maximum signty from May-November. Maximum heterotrophic bacterial populations occurred dur-ing the July-August period. On a Lake-wide basis, coliforms increased to maximum levels during the September-October period and dropped during November to the levels found in the spring season. Fecal coliform, fecal streptococcus and heterotrophic bacterial populations exhibited trends similar to those observed in the coastal areas. At least 85% of the analyzed water samples showed fecal coliform and fecal streptococcus populations less than 1 per 100 ml. (Environment Canada) W75-06738

SIMPLE COLOUR METER FOR LIMNOLOGI-CAL STUDIES,

Canada Centre for Inland Waters, Burlington (Ontario). ry bibliographic entry see Field 7B.

RADIONUCLIDE LEVELS IN THE GREAT LAKES WATERS - 1973, Canada Centre for Inland Waters, Burlington

(Ontario).

For primary bibliographic entry see Field 5A. W75-06744

TRANSIENT RESPONSE OF SHALLOW EN-CLOSED BASINS USING THE METHOD OF NORMAL MODES, Canada Centre for Inland Waters, Burlington

(Ontario)

D. B. Rao. Scientific Series No. 38, 30 p, 1974, Inland Waters Directorate. 11 fig, 8 ref, 3 tab.

Descriptors: *Lakes, *Waves, Basins, Theoretical analysis, Analytical techniques, Model studies, Water circulation, Water levels, Equations, Forecasting.

Identifiers: *Wind stress, *Normal modes, Oscillations, Dynamic analysis.

Predicting the two-dimensional forced response (or the storm surge) of an arbitrary water body is discussed in terms of the normal mode expansion technique. Such an approach eliminates space dependence from the governing equations. Time-de-pendent aspects of the problem may then be solved either by a numerical evaluation of a form integral solution, which involves the normal mode functions and the wind stress field, or by a direct finite-difference integration in time alone by some explicit or implicit schemes. Hence the use of normal mode expansion procedure eliminates a complete numerical integration of the problem on a space-time finite difference grid, and offers certain advantages in avoiding such problems as com putational stability, grid-dispersion, etc. A method is described for constructing the quasi-static normal modes for an arbitrary rotating basin and different methods are presented for obtaining the general solution for the forced response. Applicais then considered. One case deals with the response of a non-rotating rectangular basin of uniform depth to a semi-infinite stress band propagating across the basin in a given direction; the other deals with the effect of an instantaneously imposed wind stress on a rotating rectangu-lar basin of uniform depth. (Environment Canada)

COMPUTER ROUTINE FOR CALCULATING TOTAL LAKE VOLUME CONTENTS OF A DIS-SOLVED SUBSTANCE FROM AN ARBITRARY DISTRIBUTION OF CONCENTRATION
PROFILES - A METHOD OF CALCULATING
LAKEWIDE CONTENTS OF DISSOLVED SUB-

Canada Centre for Inland Waters, Burlington (Ontario).

F. M. Boyce Technical Bulletin 83, 1973, 25 p, Inland Waters Directorate. 5 fig, 2 ref, 4 append.

Descriptors: *Computer programs, *Lakes, *Dissolved solids, Sampling, Theoretical analysis, Estimating, Bathymetry, Measurement, Hydrography, Mathematical studies, Data processing, Volumetric analysis, Algorithms, Lake Ontario, Identifiers: Digital maps.

A computer program is described for calculating total lake volume of a dissolved substance using an arbitrary distribution of concentration profiles. The effects of bottom topography are taken into account in the calculations. The program was originally developed for the computation of lake total stored heat based on BT temperature profiles but has a wide range of applications. Adaptions of the technique have been developed to compute lake volume above or below any surface defined by an arbitrary distribution of measured depths. The method is useful for repeated surveys of the same lakes and adjusts to changes in sample pattern and lake water levels. Appendices explain the construction of digital maps of lake bathymetry assignation of algorithms to stations, and the data format. Appendix D contains the Fortran listing of splotch as coded for a CDC 6400 computer. (Environment Canada) W75-06748

PHYTOPLANKTON OF THE NATRON-CONTAINING WATERS OF KANEM (CHAD): V. THE MESOHALINE LAKES (IN FRENCH), Office de la Recherche Scientifique et Technique Outre-Mer, Fort-Lamy (Chad).

For primary bibliographic entry see Field 5C.

HYDROBACTERIOLOGICAL INVESTICA. TIONS IN LAKE CONSTANCE: III. PROGRES- SIVE GROWTH OF PLANKTON-DEPENDENT PRODUCTION OF BACTERIA AS AN INDICA-TION OF EUTROPHICATION, (IN GERMAN), Staatliches Institut fuer Seenforschung und Seen-bewirtschaftung, Langenargen (West Germany). For primary bibliographic entry see Field 5C.

A PRELIMINARY PHYTOPLANKTON SURVEY OF TWELVE ADIRONDACK LAKES, New York State Dept. of Environmental Conser-vation, Delmar. Wildlife Research Lab.

For primary bibliographic entry see Field 5C.

THE FLOATING LOG AND STUMP COMMUNITIES IN THE SANTEE SWAMP OF SOUTH CAROLINA, South Carolina Univ., Columbia. Dept. of Biology.

For primary bibliographic entry see Field 21. W75-06845

PHYTOPLANKTON PERIODICITY OF SOME NORTH SHROPSHIRE MERES,

Freshwater Biological Association, Shrewsbury (England), Meres Lab. C. S. Reynolds.

Br Phycol J, Vol 8, No 3, p 301-320, 1973. Illus. Identifiers: England, *Meres(North Shropshire), Periodicity, Physicochemical *Phytoplankton periodicity, Seasonal.

The seasonal succession of phytoplankton in 12 Shropshire (England) meres and pools is presented, together with notes on isolated collections from 8 others in the region. In the majority of the waters investigated, the annual periodicity conforms to a typical pattern. Departures from this established pattern are discussed in relation to differences in physico-chemical conditions of the water-bodies .-- Copyright 1974, Biological Abstracts. Inc.

2I. Water In Plants

POPULATION DYNAMICS, BIOLOGY AND ESTIMATION OF PRODUCTION IN BENTHIC MOLLUSCA OF LAKE CHAD, (IN FRENCH),

Ecole Normale Superieure, Paris (France). Laboratoire de Zoologie.

C. Leveque. Cah ORSTOM Ser Hydrobiol. Vol 7, No 2, p 117-147, 1973, Illus, English summary.

Descriptors: *Mollusks, *Lakes, *Benthic fauna, Aquatic populations, Biomass, Aquatic animals, *Reproduction, Africa. Identifiers: Bellamya, Lake Chad, Cleopatra, Cor-

bicula, Melania.

In accordance with periodical samplings, popula-tions of benthic mollusks from Lake Chad were observed for more than 1 yr in 3 localities (Samia, Bol et Baga Kawa). The evolution of the demo-Bol et Baga Kawa). The evolution of the demographic structure (size structure) of the populations during successive samplings has provided the opportunity to study the biology of certain species and, more particularly, reproduction periods and longevity. Bellamya and Melania reproduce year round, but during the cool season there is a decrease in the birth rate. Corbicula have a heavy expreduction during this cool season. The normal 1 reproduction during this cool season. The normal 1 yr life span of Corbicula, can be extended (to 3 yr nd more) under certain environmental conditio After a brief explanation of 2 methods of production calculation in the case of cohorts (Bojsen Jensen method and method of instantaneous growth rate), I method is suggested which is available as well for populations with complex age structure. This method requires using both the average weight increase of 1 individual and the demographic structure of populations. With this

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method, the instantaneous growth rate of the population (G) may be obtained and the instantaneous production estimated with the formula p = G X Biomass. This method was tested before it was applied to benthic mollusks populations from lake Chad. With the cohorts of Corbicula and Bellamya in experimental in situ rearings, the results with this method or with more classical ones are very similar. It is the same for the Bellamya populations in experimental rearings. The annual production (for dry organic weight and for shell weight) of natural populations of Melania, Cleopatra, Bellamya and Corbicula was estimated in localities where the studies of demography and dynamics were effected. The annual production/biomass (P/B) ratio was also calculated. Ac-cording to the species and localities, it varies between 3 and 6. The use of instantaneous growth rate (G) of the population is discussed. The presence of a relation between G and the average weight of an individual of the population (W) is pointed out for different species. This relation is valid only within certain limits of W. On the other hand, another fairly good relation exists between G and average longevity for different species of aquatic molluscs .-- Copyright 1974, Biological Abstracts. Inc. W75-06360

WIND-BLOWN DUST AS A SOURCE OF NUTRIENTS FOR AQUATIC PLANTS. Canterbury Univ., Christchurch (New Zealand). Dept. of Zoology.
For primary bibliographic entry see Field 2H.
W75-06406

SOME DIFFERENCES IN WATER REGIMEN OF ULMUS PUMILA L. OF DIFFERENT GEO-GRAPHICAL ORIGIN,

Moscow State Univ. (USSR). Dept. of Plant Physiology.

F. Z. Borodulina, and T. A. Borisova. Vestn Mosk Univ Ser 6 Biol Pochvoved. Vol 28, No 2, p 99-101, 1973.

Descriptors: *Trees, *Water storage, Transpiration, Leaves, Geographical regions. Identifiers: *Ulmus-pumila.

The influence of U. pumila origin on water regimen of trees growing in equally favorable conditions of water supply was detected. Differences in water content of leaves, intensivity of transpiration and water retaining ability were observed.--Copyright 1974, Biological Abstracts, Inc.

A STUDY OF EDDY FLUXES OVER A FOREST. Commonwealth Scientific and Industrial Research Organization, Aspendale (Australia). Div. of Atmospheric Physics.
B. B. Hicks, P. Hyson, and C. J. Moore

Journal of Applied Meteorology, Vol 14, No 1, p 58-66, February 1975. 7 fig, 3 tab, 10 ref, append.

Descriptors: *Australia, *Heat flow, *Forests, *Micrometeorology, Temperature, Humidity, Winds, Eddies, Pine trees, Air temperature, Heat balance, Heat budget, Instrumentation, Momentum transfer.

Identifiers: Temperature gradients, Eddy-correla-tion equipment, Wind profiles, Heat storage, Mt. Gambier(Australia).

Eddy correlation instruments mounted above a plantation of Pinus radiata near Mt. Gambier, south Australia, were operated during two periods of intensive effort, in May and October 1972. Measurements of the Reynolds stress and of wind speed gradients showed that the zero plane for mo-mentum is located at about d=0.8h (where h is the height of the trees), and that the roughness length of the surface is about 30% of the difference (h-d). Sensible heat fluxes and temperature gradients give a displacement length not significantly dif-

ferent from that applicable in the momentum case, but the roughness length for sensible heat transfer is smaller than that for momentum, by about a factor of 3. Advective effects were found to be important, particularly when the fetch across the canopy is less than about 0.8 km. Long-fetch cases allow an evaluation of the heat storage in the canopy and in the air below the height of eddy flux measurement. The rate of heat storage was found to be about 60 plus or minus 20 W/sq m/degree C/h of canopy temperature change (for a densely packed forest with trees about 13 m high), which is compatible with measurements of the biomass and assumed specific heats. The residual heat energy at about 6 m above the effective zero plane, unaccounted for by the various measured fluxes, was found to be related to the difference in net radiation over grassland and forest. (Sims-ISWS) W75-06498

WATER-RETAINING ABILITY AND PROTEINS OF LEAVES AND CHLOROPLASTS IN PLANTS WITH DIFFERENT DROUGHT-RESISTANCE.

(IN RUSSIAN), Akademiya Nauk Moldavskoi SSR, Kishinev. Inst. of Plant Physiology and Biochemistry.
M. D. Kushnirenko, E. V. Kryukova, and S. N. Fiziol Rast Vol 20, No 3, p 582-589, 1973. Illus. En-

glish summary.

Descriptors: *Plants, *Water storage, Leaves, *Drought resistance, Plant physiology, *Drought tolerance, Beaus, Electrophoresis, Proteins. Identifiers: Chlorophyll, Chloroplasts, Horse bean, Phaseolus-Sp, Cytoplasm.

Plants of Phaseolus and horse bean, hardened to drought before sowing by the method of P.A. Henckel (experimental) and non-hardened (control), were studied. Studies were made on the water-retaining ability (WA) of the leaves and chloroplasts, the hydrophilic nature (HN) of the air-dried leaves and chloroplasts and the state of chlorophyll-protein-lipid complex of the plastids. The proteins were conventionally subdivided into 2 fractions (high and low solubility), each consisting of many components. Both fractions were subjected to electrophoresis. WA of the leaves is lower than that of the chloroplasts. HN and WA of the leaves and chloroplasts of Phaseolus and horse bean, resistant to drought, is higher than in the control. The content of chlorophylls a and b is higher in the leaves of horse bean. However this pigment was bound stronger to the olipo-protein complex of the plastids in the drought-resistant plants of Phaseolus and horse bean. Soluble proteins of the leaves, cytoplasm and chloroplasts and more heterogenous and mobile during elec-trophoresis in the drought-resistant plants. The protein zones with the same electrophoretic mo-bility were detected in the leaves and chloroplasts of the drought-resistant plants of Phaseolus and bean. This water exchange of the chloroplasts may help to understand the regulatory mechanism of plant adaptation to drought.--Copyright 1974, Biological Abstracts, Inc.

DIARTHRON VESICULOSUM (THYMELAEACEAR) AN ECOLOGICAL PUZ-ZLE: STUDIES ON THEROPHYTES ON STEPPE OF KABUL/AFGHANISTAN: II. THE EFFECT OF DROUGHT ON MINERAL RATIOS AND CARBOHYDRATE METABOLSIM, (IN

GERMAN),
Bonn Univ. (West Germany). Pharmakog-nostisches Institut.
Siegmar-W. Breckle, and Ulrich Kull.

Siegmar-W. Berckie, and Urich Kui.
Bot Jahrb Syst Pflanzengesch Pflanzengeogr, Vol
93, No 4, p 539-561, 1973. Illus. English summary.
Identifiers: *Afghanistan(Kabul), Carbohydrates,
'Diarthron-vesiculosum, Drought, *Ecological
studies, *Metabolism, Minerals, Scabiosa-olivieri,
Steppes, Therophytes, Thymelaceceae, Ziziphora-

D. vesiculosum (Fisch. et C.A. Mey.) Mey. is an annual which Korovin reported endures the dry summer in the deserts of Turkmenistan in living condition. In the surroundings of Kabul/Afghanistan, Ziziphora tenuior L. and Scabiosa olivieri Coult. were also studied in addition to Diarthron. Neither investigation of the phenological, morphological, and osmotic conditions (part I), nor studies of the mineral and carbohydrate contents gave any confirmation for the Russian observation. However, the 3 therophytes differ gradually in their behavior against drought. Diarthron shows the lowest mineral contents contrast to the 2 other annuals, in Diathron the content of carbohydrates and their portion is osmotically effective substances decrease during the ontogeny. The importance of slime-content in Diarthron remains obscure. Ziziphora wilts earlier and more rapidly than the other 2 spp., only a few days after the last rain. Scabiosa shows a behavior more similar to Diarthron, even more tolerant to drought. Suitable relations and measures are discussed, able to express the results of the analyzed substances. The concentrations of inorganic ions are expressed also as portions of the potential osmotic pressure of the cell sap. The composition of the plants during their ontogeny is also given .-- Copyright 1974, Biological Abstracts,

W75-06561

COMPLEXES OF SOIL INVERTEBRATES IN SWAMPY FORESTS IN THE TAVDA-KUMA IN-TERRIVER REGION (IN RUSSIAN), L. S. Kozlovskaya, and N. I. Shadrina. Tr Inst Ekol Rast Zhivotn Ural Fil Akad Nauk

SSSR. 83. p 182-193, 1972, Illus.

Descriptors: *Invertebrates, Soils, *Swamps, Vegetation, Diptera, Insects, Ne-

Personal Per Identifiers: *USSR(Tavda-Kuma region),
Acarina, Aulacomnium-palustre, Callus-palustris,
Carex-appropinquata, Carex-globularis, Carexlimosa, Carex-rynchophysa, Carex-tenuiflora,
Carex-vesicaria, Chaemedaphne-calyculata,
Coleoptera, Collembola, Dryopteris-linnaeane,
Enchytraeidae, Equisetum-palustre, Hylocomium-splendens, Ledum-palustre, Lumbricidae, Oxalis-Acetosella, Pleurozium, Russian-SFSR,
Sphagnum-centrale, Tomenthyphum-nitens.

Group composition and number of soil invertebrates were studied in the Tavda-Kuma interriver region (Russian SFSR, USSR) in 1965-1966 to determine the biological activity of the soil and the prospects for increasing it. Data from geobotanical descriptions, chemical analyses of soil, observations at the level of soil ground waters and precipitation which characterize the ecology of the animals' habitat were used. Samples for study of microfauna were selected over the course study of microtauna were selected over the course of the vegetation period at the end of every month. Incidence of the following animal groups varied in different types of marshy forests: Acarina, Col-lembola, Enchytraidae, Diptera, Coleoptera, Ne-matodes, Lumbricidae. The following species of vegetation were observed: Carex appropinquata, C. globularis, C. limosa, Tomenthyphum nitens, Aulacomnium palustre, Carex vesi caria, Callus palustris, Sphagnum centrale, Ledum palustre, Chamaedaphne calyculata, Equisetum palustre, Carex tenuiflora, C. rynchophysa, Hylocomium splendens, Pleurozium, Dryopteris linnaeane, Ox-alis acetosella. Larvae of the following families were observed: Yantharididae, Carabidae, Sciaridae, Chironomidae, Tipulidae, Bibianidae, Muscidae, Cantharididae, Lithobiidae, Diptera, Tabanidae, Dolichopodidae, and Rhagionidae. Data revealed characteristic complexes of invertebrates in various soil types.--Copyright 1974, Biological Abstracts, Inc. W75-06651

FOREST CONDITIONS IN THE CENTRAL PORTION OF THE TAVDA RIVER BASIN AND

THE TAVDA-KUMA INTERRIVER REGION (IN

RUSSIAN), B. P. Kolesnikov.

e

Tr Inst Ekol Rast Zhivotn Orai Fil Akad Nauk SSSR. 83. p 7-26, 1972, Illus.

Identifiers: Climates, Conifers, *Forests, Hardwood, Marshes, Morphology, Pine, Precipitation(Atmospheric), Rivers, Soils, *USSR(Transural region), *River basins.

Literature on forest conditions in the Transural region (USSR) is reviewed. Studies focused on the vicinity of the Tayda River basin and the Tayda-Kuma interriver region. Relief, surface structure. evolution of the surface, climate, soil conditions, precipitation, hydrological regime and vegetation covering are considered. Forest conditions are compared in the following region: Tavda right-bank pine forest region; Tavda left-bank marshy-pine forest region; and Tavda-Kuma interriver dark conifer-hardwood region, which may be divided into 2 regions from the standpoint of utilization of forest resources .-- Copyright 1974, Biological Abstracts, Inc. W75-06652

BUILDING STONES OF MODERN PHYSIOLO-GY: ECOPHYSIOLOGY OF PLANTS, K Kreeh

VEB Gustav Fischer Verlag: Jena, East Germany. 1974. 211 p, Illus.

Descriptors: Plants, Ecosystems, *Plant physiology, Solar radiation, Radiation, Temperature, Water balance, Water transfer, *Environmental

Various aspects of plant ecophysiology are discussed. The 1st sections deal with ecology and ecophysiology and the importance of solar radiation. The next sections deal with radiation and temperature relationships, radiation and material production and the factor of water balance and transport. Further environmental factors such as pH, food, CO2, nitrogen and minerals, the combined effect of environmental factors and models of stomate regulation mechanisms and transpira-tion, growth and environmental protection are also discussed .-- Copyright 1974, Biological Abstracts, W75-06709

PERIPHYTON DYNAMICS IN LABORATORY STREAMS: A SIMULATION MODEL AND ITS IMPLICATIONS,

IMPLICATIONS,
Oregon State Univ., Corvallis. Dept. of Botany.
C. D. Mcintire.
Ecol Monogr. Vol 43, No 3, p 399-420, 1973, Illus.
Identifiers: Grazing, Laboratory streams, Light,
*Model studies, *Oregon, *Periphyton, Respiration, Seasons, Silt, Simulation analysis, Snails,
Streams, Vegetation, *Lotic environment.

A simple and an expanded model of periphyton dynamics in lotic environments are described. The simple model includes 1 level variable, the ass of the periphyton assemblage, and 4 rate variables: primary production, community respira-tion and 2 export fractions. In the expanded model 3 level variables and 8 rate variables are added to the simple model to introduce the effects of allochthonous organic matter and grazing activities by an aquatic snail. In general, computer output from the expanded model supports the hypothesis that the relatively low biomasses of periphyton observed in the small streams of western Oregon, are the result of grazing activities by aquatic animals, high silt loads during the fall and winter months and the effects of a dense canopy of terrestrial vegetation on light penetration. Furthermore, the nodel indicates that it is bioenergetically feasible for a periphyton biomass of about 10 g/sq m ash-free dry weight to support a consumer biomass of 150 g/sq m or more if the productive capacity of the system is sufficient. The simulation models provided an analytical way of synthesizing the results of a number of experiments with periphyton assemblages, identified weaknesses in the experimental data, and provided insights into the dynamics of periphyton assemblages that could not be obtained by intuition alone or by examining the results of individual experiments .--Copyright 1974, Biological Abstracts, Inc. W75-06714

COMPARISON OF FEEDING AND BIODEPOSI-TION OF THREE BIVALVES AT DIFFERENT FOOD LEVELS.

Woods Hole Oceanographic Institution, Mass.

Dept. of Biology.
K. R. Tenore, and W. M. Dunstan.

Mar Biol (Berl). Vol 21, No 3, p 190-195, 1973. Identifiers: *Biodeposition, Bivalves, Crassostrea-virginica, Feeding, Food, Mercenaria-mer-cenaria, Mytilus-edulis, *Oysters, *Mussels.

Experiments on the edible mussel Mytilus edulis, the American oyster Crassostrea virginica, and the hard clam Mercenaria mercenaria, using flowing systems, showed that the feeding and biodeposition rates were affected by food concentration. At all levels of food concentration, the order of increasing feeding rate (both the percent of available particulate carbon and the actual amount of carbon removed) was: clam < oyster < mussel. All bivalves exhibited lower feeding rates (both percent and actual) at low food concentrations. However, the percent of available food removed quickly increased to a maximum at food concentrations typical for the natural environment. This maximum remained constant for the mussel and oyster, but declined with increasing food concentration for the clam. However, because this percentage was for increasing levels, the actual C removed continued to increase up to the highest food level for all 3 bivalves. In increasing order of biodeposition rate, the bivalves were: clam < oyster < mussel. The biodeposition rates of the 3 bivalves increased logarithmically with increased food concentration as a result of the production of pseudofecs. The feeding and biodeposition data were used to calculate assimilation rates, and this pointed out the higher efficiency of the oyster compared to the mussel and clam .-- Copyright 1974, Biological Abstracts, Inc. W75-06724

A LIMNOLOGICAL STUDY OF TASSHA-GAWA RIVER NEAR THE SADO MARINE BIOLOGICAL STATION OF NIIGATA UNIVER-SITY.

Niigata Univ. (Japan). Dept. of Biology.

Y. Honma, T. Matsuki, N. Hokari, T. Oka, and Y.

Annu Rep Sado Mar Biol Stn Niigata Univ. 3 p 11-21, 1973. Illus.

Identifiers: Algae, *Biological studies, Crabs, Diatoms, Electrical conductivity, Fish, Insects, *Japan(Tassha-Gawa River), *Limnological studies, Marine, Protozoa, Rivers, Snails, Temperature, Hydrogen ion concentration

Observations were made to elucidate several limnological conditions of Tassha-gawwa River, Japan, such as water temperature, pH, transparency and electric conductivity, and the benthic organisms collected quantitatively in the six stations were examined. In all, 19 spp. of aquatic insects, 59 spp. and varieties of diatoms, 18 spp. of blue-green algae, 12 spp. of green algae and 2 spp. of protozoan animals were identified. One species of freshwater crab and a snail were also obtained. In addition to these benthic organisms, 10 spp. of freshwater fishes were listed. As this river in the vicinity of the Sado Marine Biological Station is quite small, clean and rapid, the biotic communities are very scarce and simple.—Copyright 1974, Biological Abstracts, Inc. W75-06836

PROGRESS REPORT OF RESEARCH WORK IN TASEK BERA, MALAYSIA,

Osaka Kyoiku Univ. (Japan). Lab. for Science Education. T. Mizuno

Mem Osaka Kyoiku Univ III Nat Sci Appl Sci, 21 p, 111-113, 1972. Illus.

Identifiers: *Biological studies, International Biological Program, *Malaysia(Tasek Bera), Phytoplankton, Zooplankton, *Aquatic animals,

The production of freshwater organisms in SE Asia was studied as part of the researches of the International Biological Program. A general surwas carried out from Oct. 5, 1970-April 10, 1971. Zooplankton, phytoplankton, small attached animals and benthic animals were studied .-- Copyright 1974, Biological Abstracts, Inc. W75-06838

ELECTRON-MICROSCOPICAL INVESTIGA-TIONS ON WAX-COVERED STOMATAS, (IN GERMAN).

Hohenheim (Landwirtschaftliche Universitaet Hochschule)(West Germany) Laboratorium fuer Elektronenmikroskopie.

Planta (Berl), Vol 117, No 2, p 153-161, 1974. Illus. English summary.

Identifiers: Brassica-napus, Chelidonium-majus,

*Electron microscopy, Humidity, *Leaves, Nelumbo-nucifera. *Stomatas(Wax-covered). Nelumbo-nucifera. Transpiration, Tropaeolum-majus.

The wax structure of plant leaves (Brassica napus, Chelidonium majus, Tropaeolum majus, Nelumbo nucifera) was investigated by scanning electron microscopy and with the replica technique by transmission electron microscopy. In addition to replicas of the wax layer, replicas of the leaf surface after removal of the wax were examined. The wax layer is very thick and felt-like, especially when the plants were grown at low humidity. In this case the stomatas were also smaller than those of plants grown at high humidity. The amount of transpiration of leaves was correlated to the different formation of the wax layer. Thick and feltlike structure of the wax above the stomatas reduces the water loss considerably. On the other hand all water evaporates from leaves in a short time after removal of the wax.--Copyright 1974, Biological Abstracts, Inc. W75-06842

THE FLOATING LOG AND STUMP COMMUNI-THE SANTEE SWAMP OF SOUTH

CAROLINA, South Carolina Univ., Columbia. Dept. of Biology. W. M. Dennis, and W. T. Batson. Castanea, Vol 39, No 2, p 166-170, 1974.

Descriptors: Boehmeria-cylindrica, *Biological communities, Density, Floating logs, Frequency, Hypericum-walteri, Log, *South Carolina, Stump, *Swamps, Vitality, *Santee Swamp(SC).

A study was made of the floating log and stump communities of the Santee Swamp, Sumter County, South Carolina. The species inhabiting these communities were identified; percent frequency mean density and vitality were determined; and the substrate was characterized as to species, degree of decay and position, as floating or at-tached. Twenty-four species were recorded in the 30 samples studied. The communities were homogeneous as to dominants with 2 spp., Hypericum walteri and Boehmeria cylindrica having frequency values in the 80-100% class and 19 spp. with frequency values in the 0-20% class.-Copyright 1974, Biological Abstracts, Inc. W75-06845

AVAILABILITY OF AMINO ACIDS OF RATIONS WITH A PREDOMINANCE OF FISH

Group 21-Water In Plants

MEAL AND SPLEEN FOR TWO-YEAR-OLD RAINBOW TROUT SALMO IRIDEUS, (IN RUS-SIAN), Vsesoyuzni Nauchno-Issledovatelskii Institut Pru-

dovogo Rybnogo Khoziaistva, Rybnoe (USSR). M. A. Shcherbina, and S. P. Tryamkina. W. A. Sicheroma, and S. F. Hyamania. Vopr Ikhtiol, Vol 14, No 1, p 128-133, 1974. Identifiers: *Amino-acids, Availability, *Fish meal, *Rainbow trout, Rations, Salmo-irideus, Spleen, Trout, Fish foods.

The availability of amino acids was determined in 2 qualitatively different rations for pond-reared rainbow trout (S. irideus), one of which contained 55% spleen and 15% fish mean and the other 35% fish meal without spleen. Experimental data are given on the content of 9 indispensable amino acids (lysine, histidine, arginine, threonine, methionine, valine, phenylalanine, isoleucine and leucine), 6 nonessential amino acids (aspartic acid, phenylalanine), and a specific acid, a serine, glycine, glutamic acid, alpha-alanine, tyrosine) in rations, the indices of their availability for 2-yr trout and the amino acid requirement of trout. Problems of the correspondence of the trout's requirements and the quantitative content of available amino acids in rations are discussed .--Copyright 1974, Biological Abstracts, Inc. W75-06847

CESTODES IN FISH FROM A POND AT ILE-IFE, NIGERIA, Ife Univ. (Nigeria). Dept. of Biological Sciences.

E. A. Aderounmu, and F. Aneniyi. Afr J Trop Hydrobiol Fish, Vol 2, No 2, p 151-156,

Identifiers: Anomotaenia-sp, *Cestodes, Clariaslazera, *Fish, Floods, Hemichromis-fasciatus, Heterobranchus-bidorsalis, Intestine, Lumen, *Nigeria(Ile-Ife), l Ponds, Tilapia-nilotica. Polyonocobothrium-clarias,

About 55% of the fish examined at Ile-Ife, Nigeria, including Clarias lazera, Heterobranchus bidor-salis, Tilapia nilotica and Hemichromis fasciatus, were infected with endoparasites. Anomotaenia sp. (Cestoda) was found in the upper intestines of Hemichromis fasciatus and T. nilotica. This is the 1st record of this parasite in Nigeria and the 1st host record for H. fasciatus. Polyoncobothrium clarias (Cestoda) was found in the intestinal lumen of C. lazera. A lessening of infection from Nov. to Jan. in H. fasciatus and T. nilotica was noted; this decrease corresponded to the gradual subsiding of annual floods.--Copyright 1974, Biological Ab-W75-06849

2J. Erosion and Sedimentation

THE REMOTE SENSING OF SUSPENDED SEDIMENT CONCENTRATIONS OF SMALL IMPOUNDMENTS, Agricultural Research Service, Chickasha, Okla. Southern Great Plains Watershed Research

Center.

For primary bibliographic entry see Field 7B. W75-06399

JACKSON HOLE FLOOD CONTROL PRO-

Committee on Channel Stabilization (Army). For primary bibliographic entry see Field 4A. W75-06475

BEACH PROCESSES ON THE OREGON COAST, JULY, 1973, Williams Coll., Williamstown, Mass. For primary bibliographic entry see Field 2L. W75-06493

BED FORM RESPONSE TO NONSTEADY

Army Engineer District, Sacramento, Calif.

D. M. Gee.

Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 101, No HY3, Proceedings Paper 11195, p 437-449, March 1975. 7 fig, 2 tab, 8 ref, 2 append. NSF Grant GK-19907.

Descriptors: *Dunes, *Bed load, *Sand bars, *Sediment transport, *Flumes, Laboratory tests, Hydraulic roughness, Rivers, Flood flow, Sedimentation, Energy gradient, Hydraulics, Steady

Identifiers: *Bed forms.

Sediment transport affects the stage-discharge relationship of an alluvial river during a flood event. Changes in bed form in response to changes in discharge and the response times were studied in laboratory flumes. A flood event was viewed as a series of discharges, all characterized by uniform flow at constant energy slope. The bed form response was studied by forcing a transition of bed forms between two distinct equilibrium states. The experiments were conducted in a long recirculating type flume in the Hydraulic Laboratory of the ing type flume in the Hydraulic Laboratory of the Unversity of California at Berkeley. The bed load transport rate varied during a transition. The response time was defined as that time required for 95% of the change from the initial to the final (the equilibrium) depth to occur. The generation of dunes appeared to proceed at a greater efficiency than the destruction of dunes. The mechanism by which the bar dimensions change is the transport of bed material as bed load. The bar roughness of a natural stream and the discharge may become out of equilibrium if the dischage changes more rapidly than the transport rate can alter the bar roughness. This disequilibrium may contribute to nonunique rating curves observed for some streams during flood events. (Singh-ISWS) W75-06533

COULEE ALIGNMENT AND THE WIND IN SOUTHERN ALBERTA, CANADA, Lethbridge Univ. (Alberta). Dept. of Geography. C R Reaty

Geological Society of America Bulletin, Vol 86, No 1, p 119-128, January 1975. 9 fig, 1 tab, 38 ref.

Descriptors: *Canada, *Geomorphology, *Winds, Joints(Geologic), Chinook, Recent epoch, Drainage patterns(Geologic), Erosion, Wind ero-sion, Canyons, Valleys, Distribution patterns, Dunes, Streams. Identifiers: *Coulees, Alberta, Rose diagrams,

Alignment patterns

Study of the distinctive pattern of alignment and geographical distribution of more than 250 coulees in the plains of southern Alberta shows that (1) the roules in question have a mean orientation of N 70 degrees E, and (2) their spatial distribution is not ubiquitous but rather displays a concentration in the area from Lethbridge west to the Rocky Mountain front. Several possible hypotheses of origin of the aligned coulees were considered, including subsurface structural control, the role of regional slope, the effect of lithologic differences, regional slope, the effect of lithologic differences, and wind action. Action of postglacial wind, operating to initiate surface furrows (by wind-driven snow or rain) that were enlarged by running water, accounts for the three outstanding characteristics of the aligned coulees: (1) their preferred orientation of N 70 degrees E, which approximates the mean direction of the strongest chinook winds in the southern Alberta plains; (2) their geographical distribution which coincides with that part of cal distribution, which coincides with that p the region experiencing the most pronounced chin-ooks; and (3) their almost exclusive location on windward topographic surfaces. No other hypothesis of origin is known that can satisfactorily explain all of these observed facts. (Visocky-ISWS) W75-06543

THE COASTAL SEDIMENT COMPARTMENT, Macquarie Univ., North Ryde (Australia). School of Earth Sciences.

For primary bibliographic entry see Field 2L. W75-06551

BEACH EROSION CONTROL-TRUST FUND ACCOUNT. For primary bibliographic entry see Field 6E. W75-06597

STORM RUNOFF AND TRANSPORT OF RADIONUCLIDES IN DP CANYON, LOS ALAMOS COUNTY, NEW MEXICO, LOS Alamos Scientific Lab., N. Mex. For primary bibliographic entry see Field 5B. W75-06636

SEDIMENT SAMPLING NEAR MOUND LABORATORY - JULY 1974, Health and Safety Lab. (AEC), New York For primary bibliographic entry see Field 5A. W75-06800

2K. Chemical Processes

AUTOMATED ANALYSIS FOR CYANIDE, Technicon Industrial Systems, Tarrytown, N.Y. For primary bibliographic entry see Field 5A.

LANDFORM-SOIL-VEGETATION-WATER CHEMISTRY RELATIONSHIPS, WRIGLEY AREA, N.W.T.: II. CHEMICAL, PHYSICAL, AND MINERALOGICAL DETERMINATIONS AND RELATIONSHIPS, British Columbia Univ., Vancouver. Department

of Soil Science. For primary bibliographic entry see Field 2G. W75-06440

THE EFFECT OF INCREASES IN THE AT-MOSPHERIC CARBON DIOXIDE CONTENT ON THE CARBONATE ION CONCENTRATION OF SURFACE OCEAN WATER AT 25C, Liverpool Univ. (England). Donnan Labs G. Skirrow, and M. Whitfield.

Limnology and Oceanography, Vol 20, No 1, p 103-108, January 1975. 2 fig, 3 tab, 14 ref.

Descriptors: *Carbon dioxide, *Oceans, *Atmospheric pressure, Water properties, *Gases, Atmosphere, Inorganic compounds, Oxides, Carbonates, Bicarbonates, Calcite, Pressure, Physical properties, Sea water, Alkalinity, Temperature, Thermal properties, Stability, Supersaturation, Calcite, Climatology, Fossil fuels. Identifiers: *Partial pressure, Oceanic mixed layer, Aragonite.

Equilibrium thermodynamics was used to assess the influence of predicted fossil carbon dioxide injections on the carbonate ion concentration in the oceanic mixed layer at 25C. The calculations indicated that a ten-fold increase is required in the atmospheric partial pressure of carbon dioxide to reduce the carbonate ion concentration to a level where calcite would begin to dissolve. This is at least three times the highest predicted partial pres-sure for atmospheric carbon dioxide. This result contradicts a number of recent claims that the calcite saturation level would be attained within the next 30 years. Such rapid removal of carbonate ions is only possible if the mixed layer is grossly out of equilibrium with the atmosphere. (Henley-(SWS) W75-06444

OXYGEN AND SULFUR ISOTOPIC COMPOSITION OF THE SULFATE IONS FROM MINERAL AND THERMAL GROUNDWATERS

OF POLAND,
Comitato Nazionale per le Ricerche Nucleari, Pisa
(Italy). Laboratorio di Geologia Nucleare.

For primary bibliographic entry see Field 5A.

CHLORIDES IN NATURAL AND ARTIFICIAL

HAILSTONES, Istituto di Fisica dell'Atmosfera, Verona (Italy). Osservatorio Scientifico. For primary bibliographic entry see Field 2B.

BACKGROUND SILVER CONCENTRATIONS IN ILLINOIS PRECIPITATION AND RIVER WATER.

Illinois State Water Survey, Urbana For primary bibliographic entry see Field 5A. W75-06506

THE EFFECT OF ALCOHOLS ON THE CAR-BONIC ACID DEHYDRATION REACTION, Oklahoma Univ., Norman. Dept. of Chemistry For primary bibliographic entry see Field 5A. W75-06521

STUDY OF THE PHYSICOCHEMISTRY OF RIVER SYSTEM IN THE FRENCH MORVAN: I. HOURLY VARIATIONS, (IN FRENCH), Institut National de la Recherche Agronomique,

Thononles-Bains (France). d'Hydrobiologie Lacustre. I. Feuillade

Ann Hydrobiol. Vol 3, No 1, p 47-57, 1972, Illus.

Descriptors: *Rivers, Europe, *Water chemistry, *Water analysis, Solar energy. Identifiers: *France(River Cure).

Variations of water physicochemistry, sunlight and air temperature were measured hourly during a day in May 1967, in the river Cure (French Mor van). The results are graphically discussed and with the help of a principal component analysis. Variations in water are not important over an hour. The statistical analysis points out the importance of sunlight over all other factors.--Copyright 1973, cal Abstracts, Inc. Biological / W75-06523

DISTRIBUTION OF ISOTOPES IN SOME NATURAL WATERS IN THE REGION NORTH OF MT. JOLMO LUNGMA. Sci Sin. Vol 16, No 4, p 560-564, 1973, Illus.

Descriptors: Arctic, Ice, Glaciers, Snow, Rivers, Lakes, Oceans, Sea water, *Natural streams, Deu-terium, Oxygen, *Isotope studies, Analytical techniques. Identifiers: Mt. Jolmo Lungma, Oxygen-18, High

d

S

Samples of glacial ice, pack snow and water from rivers, lakes and a spring at altitudes of 4550-7029 m in the region north of Mt. Jolmo Lungma show that the contents of deuterium and oxygen-18 are all lower than those in standard mean ocean water. In general, deuterium is comparatively less depleted in the solid than in the liquid phase. With regard to isotope altitude effect, age effect, profile isotopic composition and isotopic concentration in the plateau-lake, the data observed are in conformity with the environmental factors.—Copyright 1974, Biological Abstracts, Inc. W75-06699

THE SOLUBILITY OF SILICA IN CARBONATE WATERS,

L. R. Pittwell.

J Hydrol (Amst). Vol 21, No 3, p 299-300, 1974,

Descriptors: *Carbonates, *Silica, *Solubility, Silicates, Chemical reactions, Precipitates. Identifiers: Bicarbonate.

The solubility of silica in water was determined by Vinogradov in 1966 and shown to be dependent on pH, but the alkaline side was not investigated, and there is also the problem of bicarbonates, which though mildly alkaline in pH, are potentially capable of reacting with silicates to form silica and a normal carbonate. Many natural waters exist which do contain appreciable amounts of silica and bicarbonate. It is therefore of interest to know just how close these may be to precipitating silica. This was determined experimentally.—Copyright 1974, Biological Abstracts, Inc. W75-06703

BUILDING STONES OF MODERN PHYSIOLO-GY: ECOPHYSIOLOGY OF PLANTS, For primary bibliographic entry see Field 2I. W75-06709

RELATIONS AMONG PH, CARBON DIOXIDE PRESSURE, ALAKLINITY, AND CALCIUM CONCENTRATION IN WATERS SATURATED WITH RESPECT TO CALCITE AT 25C AND ONE ATMOSPHERE TOTAL PRESSURE, Wyoming Univ., Laramie. Dept. of Geology.

Contrib Geol Univ Wyo. Vol 11, No 2, p 41-42, 1972. Illus.

Identifiers: *Alkalinity, Atmospheric pressure, *Calcite, *Calcium, *Carbon dioxide, Saturated waters. Hydrogen ion concentration.

Relations among pH, alkalinity, CO2 pressure and Ca concentration for calcite saturated water at 25C were calculated by computer and presented in the form of a graph. This graph allows various problems involving the carbonate system in natural waters to be solved by inspection, rather than by hand calculation .- Copyright 1974, Biological Abstracts, Inc. W75-06711

DATA ON THE HYDROBIOLOGICAL RELA-DATA ON THE HIDROBIOLOGICAL RELA-TIONSHIPS OF THE BACKWATER OF THE BODROG RIVER NEAR SAROSPATAK: I. PRELIMINARY STUDIES ON THE DETER-MINATION OF CHARACTERISTICS OF OX-YGEN AND CARBON DIOXIDE BALANCE IN THE BACK-WATER,

ajos Kossuth Univ., Debrecen (Hungary). For primary bibliographic entry see Field 5A. W75-06720

STUDY OF PRIMARY OXYGEN PRODUCTION IN THE HUNGARIAN SECTION OF THE DANUBE (DANUBIALIA HUNGARICA LVIII), Magyar Tudomanyos Akademia, Budapest. Station for Danube Research. ary bibliographic entry see Field 5A. W75-06721

INTERLABORATORY QUALITY CONTROL STUDY NO. 7 - MAJOR CATIONS AND ANIONS,

Canada Centre for Inland Waters, Burlington

D. J. McGirr, and R. W. Wales. Report Series No. 30, 15 p, 1973, Inland Waters Directorate. 9 ref, 19 tab, append.

Descriptors: *Laboratory tests, *Quality control, *Cations, *Anions, Calcium, Magnesium, Sodium, Potassium, Alkalinity, Chloride, Sulfate, Nitrate, Hardness, Flame, Photometry, Evaluation. Identifiers: Atomic absorption, Emission, Cadmium reduction, Titration.

Two synthetic samples and one natural water sample were distributed to twenty-two participating laboratories for determination of calcium, magnesium, sodium, potassium, alkalinity, chloride, sulfate and nitrate. The results for calcium, magnesium and alkalinity were good even though the natural sample was unstable for these three parameters. The precision for calcium and total hardness was much better by titration than by atomic absorption. Precision and accuracy were good for sodium and potassium, and precision was about the same whether atomic absorption or flame emission photometry was used. Precision for nitrate at low levels was only fair by any of the variety of methods used, although the cadmium reduction method was satisfactory at higher levels. Sulfate was also determined by a variety of methods, but precision was satisfactory for most of them. Chloride was determined with acceptable precision. The natural sample was supersaturated with carbonates and therefore was unstable with respect to calcium, magnesium and alkalinity. It was stable, however, with respect to the other parameters and the synthetic samples were stable with regard to all parameters tested over a three-month period of storage. Precision and accuracy were not seriously adversely affected by either sample instability or long-distance shipment. (Environment Canada) W75-06747

AN ASSESSMENT OF AREAL AND TEMPORAL VARIATIONS IN STREAMFLOW QUALITY USING SELECTED DATA FROM THE NATIONAL STREAM QUALITY ACCOUNTING

Geological Survey, Reston, Va. For primary bibliographic entry see Field 5B. W75-06755

THE DISTRIBUTION OF MINOR ELEMENTS BETWEEN COEXISTING CALCITE AND DOLOMITE IN THE GASPORT MEMBER OF THE LOCKPORT FORMATION, LOCKPORT, NEW YORK, State Univ. of New York, Buffalo.

P. J. Michalski.

MA Thesis 1969. 53 p, 14 fig, 5 tab, 21 ref, 2 ap-

Descriptors: *Dolomite, *Calcite, *Magnesium, *Magnesium carbonate, *Diagenesis, Sedimenta-tion, Rates, Sedimentation rate, *New York. Identifiers: Gasport member, Lockport formation(N.Y.), Selective dolomitization.

Analysis of the carbonates (calcite and dolomite) in the Gasport Member of the Lockport Formation indicates that Fe and Mg contents are proportional to the dolomite concentration, and may be involved in the dolomitization process. The separate analysis of each of the coexisting carbonate phases indicates large amounts of Mg, Fe and Mn may substitute in calcite prior to or during dolomitization. Petrographic and chemical evidence indicates the incorporation of Mg, Fe and Mn in calcite may be an intermediate step in the formation of dolomite. The increased concentration of these elements in calcite as dolomitization proceeds may represent arrested stages of dolomitization. Selective dolomitization is known dolomutzation. Selective dolomutzation is known to proceed at different rates, and in many stages; it may begin as early as deposition of the carbonate muds and continue through diagenesis. Fossil material, consisting of principally calcite, swept into partially dolomitized carbonate muds would react slowly and have a lower final dolomite content than their matrix unless sufficient time was swilched for scullibrium. available for equilibrium (Bradbeer-NWWA) to be achieved. W75-06811

2L. Estuaries

CONTRIBUTIONS OF TIDAL WETLANDS TO ESTUARINE FOOD CHAINS, Maryland Univ., Prince Frederick. Center for Environmental and Estuarine Studies. For primary bibliographic entry see Field 5C. W75-06353

Group 2L—Estuaries

ESTUARINE POLLUTION IN THE STATE OF HAWAII, VOLUME 2: KANEOHE BAY STUDY, Hawaii Univ., Honolulu. Water Resources Water Resources Research Center.

For primary bibliographic entry see Field 5B. W75-06362

A STUDY OF LAGOONAL AND ESTUARINE PROCESSES AND ARTIFICIAL HABITATS IN THE AREA OF THE JOHN F. KENNEDY SPACE CENTER, Bethune-Cookman Coll., Dayton Beach, Fla.

Available from the National Technical Informa tion Service, Springfield, Va 22161 as N74-20718, \$3.75 in paper copy, \$2.25 in microfiche. Report NASA CR-137409, (1974). 31 p, 24 ref, 6 tab, 5 fig.

Habitats, *Reefs. Descriptors: *Estuaries, *Fish habitats, Biological communities, Trophic levels, Sport fish, Statistical models. Identifiers: *Artificial habitats(Fish), Biodynamics. Tires.

The influence of an artificial habitat of discarded automobile tires upon the biomass in and around it was studied, using three sites on the Banana River. One site served as a control and the other two as locations for small tire reefs. Measurements and correlation studies of the biomasses and species indicate that the biodynamics of the sites are appreciably the same in the three cases, that there are probably adequate populations at the lower trophic levels, that there are perhaps reduced numbers of upper level carnivores and that it is likely that small artificial havens can contribute to an increase in populations of certain species of amefish. (Katz) gametisn. (W75-06395

AMINES PRIMARY IN CALIFORNIA UTILIZATION BY WATERS: PHYTOPLANKTON,

California Univ., Irvine. Dept. of Developmental and Cell Biology.
For primary bibliographic entry see Field 5A.

W75-06443

THE EFFECT OF INCREASES IN THE AT-MOSPHERIC CARBON DIOXIDE CONTENT ON THE CARBONATE ION CONCENTRATION OF SURFACE OCEAN WATER AT 25C, Liverpool Univ. (England). Donnan Lab For primary bibliographic entry see Field 2K. W75-06444

WIND STRESS ON NEARSHORE AND LAGOONAL WATERS OF A TROPICAL ISLAND,

Louisiana State Univ., Baton Rouge. Coastal Stu-

Limnology and Oceanography, Vol 20, No 1, p 113-115, January 1975. 3 fig, 10 ref. ONR Contract N00014-69-A-0211-0003.

Descriptors: *Winds, *Ocean waves, Waves(Water), Lagoons, Tropical regions, Wind velocity, Shear, Stress, Shear stress, Oceans, Identifiers: *Wind stress, *West Indies(Barbados).

Wind profiles were measured over a windward lagoon and a quasi-leeward area in Barbados, West Indies, under the prevailing trade winds. Relationships between shear and wind velocities for these environments were determined. Under average wind conditions the shear stress on these coastal waters is about 72% of that of an oceanic region. (Jones-ISWS) W75-06445

RATIONAL PROTECTION OF WATER RESOURCES IN COASTAL ZONES THROUGH

PLANNED DEVELOPMENT,
Florida Univ., Gainesville. Dept. of Civil and
Coastal Engineering.

For primary bibliographic entry see Field 4B. W75-06446

A THREE DIMENSIONAL WAVE MAKER, ITS THEORY AND APPLICATION,

Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.

Journal of hydraulic Research, Vol 12, No 2, p 205-222, 1974. 2 fig, 11 ref. U. S. Army Contract DACW72-72-C-0023.

Descriptors: *Waves(Water), Theoretical analysis, *Laboratory tests, *Beaches, *Rip currents, Breakwaters, Surf, Sediment transport, Hydrau-

Identifiers: Progressive waves, *Three dimensional wavemaker. Incident waves.

A general wave maker theory was presented and used as a guide in the design of a new type of wave generator, the transverse-wave maker, a simple form of which was tested and found to generate waves in good agreement with theoretical predictions. The analogy between the wave motion generated by this type of wave maker and that of obliquely incident waves on a fully reflecting straight breakwater was noticed. The transversewave maker may be used to study the three dimensional wave motion and resulting wave induced currents occurring in the vicinity of a groin, jetty, or breakwater extending perpendicular to a gently sloping beach. Qualitative observations of the conditions in the surf zone during testing showed the formation of a very strong rip current in the center of the flume. This rip current tended to be diverted away from the centerline toward one side wall of the flume outside the surf zone. This type of trans-verse-wave maker may be modified to generate any desired mode of transverse waves by subdividing a plane wave maker into the appropriate number of separate flaps, the design being based on considerations of the sinusoidal variation across the flume of the desired transverse wave. (Bhowmik-ISWS) W75-06457

PLUNGER-TYPE WAVEMAKERS: THEORY AND EXPERIMENT,

Tetra Tech, Inc., Pasadena, Calif.

Journal of Hydraulic Research, Vol 12, No 3, p 357-388, 1974. 12 fig, 2 tab, 10 ref.

Descriptors: *Waves(Water), *Laboratory tests, *Mathematical models, *Deep water, Shallow water, Beaches, Theoretical analysis, Hydraulics,

Identifiers: *Plunger-type wavemakers, Irrota-tional flow, Oscillation, Conformal transforma-

The theory and the experimental results of a plunger-type wavemaker which generates waves by oscillating vertically in the water surface were described. A mathematical theory was presented, through which surface waves generated by a given form of plunger can be calculated as a function of plunger period and stroke. The theory was based upon the usual assumptions that the fluid is ideal, the flow is irrotational, and all motions are small. The water was considered deep, hence no effect of water depth entered into the analysis. While the theory is valid only for deep-water wave generatheoly is value only to deep water there general-tion, results were shown applicable for laboratory channels of a finite depth. The effect of the plunger geometry was assumed to be governed solely by two parameters, the depth-width ratio and the sectional area coefficient. Experiments using triangular wedge-shape plungers of two different depth-width ratios were conducted in a

wave tank. Results showed that the average scatter of the measured wave height about the theoretical prediction was 6.5%. It was considered that the theory can be used with confidence for the triangular-type plunger. No experiments for plungers of other form were conducted and no measurements of forces were included in the experiments. (Bhowmik-ISWS) W75-06458

EVIDENCE OF SHOREFACE RETREAT AND IN-PLACE 'DROWNING' DURING HOLOCENE SUBMERGENCE OF BARRIERS, SHELF OFF FIRE ISLAND, NEW YORK, Barnard Coll., New York. Dept. of Geology and

Geography. J. E. Sanders, and N. Kumar.

J. E. Sanders, and N. Kumar. Geological Society of America Bulletin, Vol 86, No 1, p 65-76, January 1975. 12 fig, 1 tab, 46 ref. NSF Grant GA-25792.

Descriptors: *Shores, *Drowned(Submerged), *Submergence, Recent epoch, Dunes, Deposition(Sediments), Lagoons, Oceans, Sea level, Beaches, Coasts, Ocean waves, Environment, Sediments, Barrier islands, Sieve analysis, Continental shelf, *New York.
Identifiers: *Fire Island(NY), *Long Island(NY), Inches drowning. Shoreface retreat.

In-place drowning, Shoreface retreat

At different times within the Holocene period, the barriers on the shelf off Fire Island, Long Island, New York, have responded to submergency through the contrasting processes of in-place drowning and landward retreat. In-place drowning is indicated by evidence of a relict shoreline 7 km seaward of the present beach at a depth of -24 m. Based on published submergence curves, this in-ferred relict shoreline is tentatively dated at 8500 to 9000 yr B.P. Two cores collected seaward of the present beach in 14 to 16 m of water contain backbarrier saltmarsh peat which has been dated at 7750 + or -125 and 7585 + or -125 radiocarbon years. These cores are evidence that the -16 m bar-rier migrated continuously landward and eventually became the modern barrier. Inlet-filling sands can serve as indicators of former locations of barriers and as criteria for determining whether barriers have been drowned in place or have migrated landward. If a barrier migrates continu-ously landward, it should leave behind a blanket of olasy individual, it should form only narrow, linear lenses parallel to the shore. (Visocky-ISWS) W75-06460

ENVIRONMENTAL STUDIES (1973), JAMES BAY TERRITORY AND SURROUNDING AREA, Department of the Environment, Hull (Quebec); and James Bay Development Corp., Montreal For primary bibliographic entry see Field 6G. W75-06467 (Quebec).

BEACH PROCESSES ON THE OREGON COAST, JULY, 1973,
Williams Coll., Williamstown, Mass.
W. T. Fox, and R. A. Davis, Jr.
Available from the National Technical Informa

Available 10th the National Technical Information Service, Springfield, Va 22161 as AD-786 237, \$4.75 in paper copy, \$2.25 in microfiche. Technical Report 12, August 30, 1974. 85 p, 32 fig, 28 ref, 2 append. ONR Contract N00014-69-C-0151.

Descriptors: *Beach erosion, *Waves(Water), *Tides, *Weather, *Sand bars, *Winds, Upwelling, Rip currents, Surf, Oregon, Atmospheric pressure, Coasts, Fourier analysis. Identifiers: *Longshore currents, Bar morpholo-

During July and August 1973, a 45-day time-series study was undertaken on the central Oregon coast to relate weather and wave conditions to beach erosion and sand bar migration. The summer weather pattern was dominated by the East-Pacific subtropical high which produced winds and waves from the northwest and extended periods of upwelling and coastal fog. When low pressure systems moved through, wind and waves shifted to the southwest. Waves were 1 to 3 meters high with periods of 5 to 9 seconds. Rip currents and southward flowing longshore currents reached 90 centimeters per second in the surf zone. Tide range was 2 to 4 meters. Three beaches were mapped at low tide to show changes in beach and bar morphology through time. At South Beach, Oregon, two sets of bars with intervening rip channels advanced shoreward at 1 to 5 meters per day and southward at 10 to 15 meters per day. At Beverly Beach, Oregon, a basalt ridge 700 meters offshore resulted in wave diffraction and sand deposition in the central portion of the beach. A rip channel at the south end of the beach moved 300 meters to the south. At Gleneden Beach, cusps 40 meters long were cut into the steep foreshore. A rhythmic topography with bars and rip channels existed in the nearshore. Sand bars advanced across the rip channels at 5 meters per day and welded onto the base of the foreshore. (Bhowmik-ISWS) W75-06493

THE COASTAL SEDIMENT COMPARTMENT, Macquarie Univ., North Ryde (Australia). School of Earth Sciences.

J. L. Davies. Australian Geographical Studies, Vol 12, No 2, p 139-151, October 1974. 2 fig, 20 ref.

Descriptors: *Coasts, *Australia, *Sediment distribution, Seashores, *Beach erosion, Sedimentation, Dunes, Littoral, Quaternary period, Sea level, Waves(Water). Identifiers: Coastal sediment compartment.

Definition of coastal sediment compartments appears necessary to the quantification of sediment budgets and the appearent general nature of such compartments and budgets in south eastern Australia is reviewed. The present situation, in which loss by deflation, inlet filling and offshore movement appears to balance or exceed gain from marine and subaerial erosion and onshore movement is contrasted with that in the mid-Holocene when it appears that many shores prograded. It is concluded that this progradation was related not to changes in sea level nor wave energy but to an excess of gain over loss due to an unusually large input from offshore. It may be possible to distinguish a broad cyclic pattern of budget progression through time within individual compartments. (Levick-CSIRO)

HEAVY METALS IN CULTIVATED OYSTERS (CRASSOSTREA COMMERCIALIS = SACCOSTREA CUCULLATA) FROM THE ESTUARIES OF NEW SOUTH WALES (AUSTRALIA), Chief Secretary's Dept., Sydney (Australia). New South Wales Fisheries Branch.

For primary bibliographic entry see Field 5B. W75-06552

THE WESTERNPORT BAY ENVIRONMENTAL STUDY,

STUDY, Victoria Ministry for Conservation, Melbourne (Australia). Westernport Bay Environmental Study. For primary bibliographic entry see Field 6G.

THE UNCERTAIN SEARCH FOR ENVIRON-

MENTAL QUALITY, Yale Univ., New Haven, Conn. School of Law. For primary bibliographic entry see Field 5G. W75-06557

W75-06555

MISSISSIPPI COASTAL ZONE MANAGEMENT APPLICATION 1974. Mississippi Marine Resources Council, Long

Beach.
For primary bibliographic entry see Field 6E.
W75-06575

PRESERVATION OF WETLANDS: THE CASE OF SAN FRANCISCO BAY, Environmental Protection Agency, Washington,

Environmental Protection Agency, Washington D.C. Office of Water Programs. For primary bibliographic entry see Field 4A. W75-06592

BISCAYNE BAY-AQUATIC PRESERVE. For primary bibliographic entry see Field 6E. W75-06598

ECOLOGICAL EFFECTS OF NUCLEAR STEAM ELECTRIC STATION OPERATIONS ON ESTUARINE SYSTEMS.

Maryland Univ., Prince Frederick. Center for Environmental and Estuarine Research. For primary bibliographic entry see Field 5C. W75-06621

AMMONIA EXCRETION BY ZOOPLANKTON AND ITS SIGNIFICANCE TO PRIMARY PRODUCTIVITY DURING SUMMER, Washington Univ., Seattle. Dept. of Oceanog-

For primary bibliographic entry see Field 5C. W75-06637

ELEMENTS IN A DECISION FRAMEWORK FOR PLANNING THE ALLOCATION OF COASTAL LAND AND WATER RESOURCES WITH ILLUSTRATION FOR A COASTAL COMMUNITY, Massachusetts Univ., Amherst. Dept. of Agricul-

Massachusetts Univ., Amherst. Dept. of Agricultural and Food Economics. For primary bibliographic entry see Field 6B. W75-06645

DISSOLVED ORGANIC MATERIAL IN THE ST. LAWRENCE MARITIME ESTUARY: COM-PARISON AND CHOICE OF METHODS (IN FRENCH), For primary bibliographic entry see Field 5A. W75-06706

LATE-STAGE PUBLIC MEETING STUDY OF THE NEW JERSEY COASTAL INLETS AND BEACHES FROM BARNEGAT INLET TO LONGPORT,

Army Engineer District, Philadelphia, Pa. For primary bibliographic entry see Field 4D. W75-06766

THE INTERCOASTAL WATERWAY: AN ECOLOGICAL PERSPECTIVE, Florida Atlantic Univ., Boca Raton. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5G. W75-06776

COMPREHENSIVE LAND USE PLANNING-ITS DEVELOPMENT AND POTENTIAL IMPACT ON COASTAL ZONE MANAGEMENT, Rhode Island Univ., Kingston. Marine Affairs Program.

For primary bibliographic entry see Field 4A. W75-06787

COASTAL ZONE PLANNING: THE IMPACT OF REGIONAL EFFORTS IN NEW ENGLAND, Woods Hole Oceanographic Institution, Mass. For primary bibliographic entry see Field 6F. W75-06790 DYE AND DROGUE STUDIES OF SPOIL DISPOSAL AND OIL DISPERSION, Delaware Univ., Newark. Coll. of Marine Studies.

Delaware Univ., Newark. Coll. of Marine Studie For primary bibliographic entry see Field 5B. W75-06831

NEW INDICATOR SPECIES IN THE BALTIC ZOOPLANKTON IN 1972, Wyzsza Szkola Rolnicza, Szczecin (Poland). Instytut Eksploatacji Zasobow Morza. For primary bibliographic entry see Field 5B. W75-06837

THE SEDIMENTARY ENVIRONMENTS OF TROPICAL AFRICAN ESTUARIES: FREETOWN PENINSULA, SIERRA LEONE, University Coll., Cardiff (Wales). Dept. of Geolo-

gy. M. E. Tucker. Geol Mijnbouw, Vol 52, No 4, p 203-215, 1973.

Identifiers: Africa, Bivalves, Crustaceans, Dry, Environment, *Estuaries, Mangroves, Peninsulas, River, Seas, Season, *Sierra-Leone(Freetown), Soils, Tropical zones, *Sediment transport.

Four main environments are described from tropical estuaries of the Freetown Peninsula, Sierra Leone: sand bars, channels, intertidal flats and mangrove swamps. The sand bars are predominantly well-sorted medium sands, and dunes as the main bed form. The channel sediments vary in grain size and bed form up the estuaries, generally contain lag deposits (mostly of shell debris and laterite pebbles) coarser than the ad-jacent intertidal sediments. The intertidal flats are mostly muddy sands, commonly with scour pits and current lineation. The sedimentary structures are obliterated by infaunal bivalves and burrowing crustaceans. The mangroves, developed peripherally around the estuaries, are important in trapping and binding finer grades of sediment. Sierra Leone has an extreme 2 season climate, considerably affecting the estuarine sediments. During the dry season, a period of accretion, much sediment (mainly bed load) is taken into the estua-ries from offshore. Crustaceans and bivalves increase in numbers and occupy a larger area of the intertidal flats. During the wet season, mud and plant debris are brought down by the rivers and some bed load is moved down or out of the estuaries. With rising sea level, the estuarine deposits are prograding landward, over fluviatile sediments soils (laterite in this case), producing a coarsening upward sequence from rootlet beds through bioturbated muddy sands to well-sorted crossbedded medium sands .-- Copyright 1974, Biological Abstracts. Inc.

PRELIMINARY STUDY, WITH EMPHASIS ON PLANKTON, OF THE WATERS FROM THE TODOS OS SANTOS BAY, (IN PORTEGUESE), Universidade Federal da Bahia, Salvador (Brazil). Inst. of Biology.

J. J. Santos. Bol Zool Biol Mar (Nova Ser), 30 p 419-447, 1973. Illus. English summary.

Identifiers: *Bays, *Brazil plankton(Todos os Santos Bay), *Estuary, *Phytoplankton, Puerto Rico, Zooplankton.

A preliminary study of the waters in the 800 km2 area of the Baia de Todos os Santos (Brazii) includes an introductory survey of the literature on the plankton collected in the region, the methods used for obtaining information on some meteorological, hydrological and hydrographical data, and on the phytoplankton and the zooplankton of the area. The study of 17 plankton samples taken at different points inside the bay are discussed and compared with those obtained from other waters along the Brazilian coast and in Puerto Rico. The water in most of the bay is coastal water enriched by the nutrients drained from the

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continent. The plankton is proportionally richer with smaller forms inside the bay than outside, off the coast. The bay contains a typically neritic planktonic structure in which the coastal forms predominate, together with estuarine species.--Copyright 1974, Biological Abstracts, Inc.

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

THE IMPORTANCE OF SALINITY IN URBAN WATER MANAGEMENT. Culp, Wesner, Culp Clean Water Consultants, Corona Del Mar, Calif. For primary bibliographic entry see Field 3C. W75-06372

RECOMMISSIONING OF SEA WATER DEMINERALIZER, SERIAL NO. 204, U.S. COAST GUARD STATION, OCRACOKE, NORTH CAROLINA.

Ionics, Inc., Cambridge, Mass. ionics, inc., Cambridge, Mass. Available from the National Technical Informa-tion Service, Springfield, Va 22161 as AD-786 398, \$3.25 in paper copy, \$2.25 in microfiche. January 1965. 14 p. 1 tab., append. Coast Guard Contract Tcg-41774; CG-52, 149A.

Descriptors: *Demineralization, *Electrodialysis, *Waste water treatment, *Desalination processes, Water purification, Equipment, Desalination, Separation techniques, Dialysis, Sea water, Slime, Filters.

During August 1964, Ionics, Inc. received a request to restart the U.S. Coast Guard continuous flow sea water demineralizer located at Ocracoke, North Carolina. The demineralizer had not been operated since October 1962. At that time, an or-ganic sliming problem was experienced in the stacks and demineralizer operation was suspended in order to perform analytical tests and to make a pretreatment study aimed at eliminating the problem. Subsequent pretreatment recomm tions on the sliming problem have been closely followed. However, the raw water storage-flocculation tank provided has a smaller capacity than originally recommended and limits the continuous operation of the demineralizer to short runs of approximately nine hours. The pretreatment system was put into operation and the demineralizer operated satisfactorily on pretreated sea water with negligible stack sliming for the duration of the tests. The unit is supplying the station's potable water requirements and its operation should also provide valuable information for evaluations of sea water demineralization by electrodialysis. (Sims-ISWS) W75-06479

SEA WATER DESALINATION BY REVERSE OSMOSIS, RECENT EXPERIENCE,

Societe Generale d'Epuration et d'Assainissement Degremont, Suresnes (France). P. Treille, and J. M. Rovel. Desalination, Vol 14, No 1, p 21-31, February

1974. 5 fig.

Descriptors: *Sea water, *Desalination, *Reverse Descriptors: Sea water, Desannation, Reverse osmosis, Water quality control, Operating costs, Desalination plants, Installation, Water treatment, Reservoirs, Chlorides, Pumping, Measurement, Operation and maintenance, Management, Waste water treatment.

Identifiers: Pumping stations, Clarification, Membrane efficiency, Optimum operation.

The sea water desalination plant at Houat, The Netherlands, in operation since July 1971, has a minimal capacity of 50 m3/day of water containing less than 250mg/1 of chlorides. A description of the installation reveals the importance of the pretreatments required for proper operation and membrane conservation. The two-stage treatment has permitted suitable adaption to the variation in operation which is a function of the season.
Operating costs are analyzed. Optimum plant operation resulting in increased production of desalinated water as a consequence of higher conversion rates is discussed. (Bell-Cornell)

CONSTRUCTION AND INITIAL OPERATION OF THE VTE/MSF MODULE, Office of Saline Water, Washington, D.C.

Desalination, Vol 14, No 1, p 1-10, February 1974. (Presented at Fourth International Symposium on resh Water from the Sea, Heidelberg, September 1973) 3 ref

Descriptors: *Water
*Desalination plants, *California,
Reclamation, Descriptors: *Water quality control, *Sea water, *Desalination plants, *California, *Design, *Design, Waste water(Pollution), Aquifers, Saline water intrusion, Construction, Water management(Applied), Injection wells, Planning, Water temperature, *Waste water treatment.

Identifiers: Environmental impact, Site selection, Cost savings, VTE/MSF module.

The VTE/MSF module being constructed at Fountain Valley, California as part of a supplemental water supply plant of advanced technology is considered. The plant combines waste water reclamation and sea water desalting to provide a good quality product water that will be injected into the Orange County aquifer as a barrier to sea water intrusion and for replenishment of the aquifer. The design of the desalting plant provides a highly adaptable test vehicle for the development of technology for the VTE/MSF process. The conpuration of four VTE evaporative stages and six MSF preheat stages is designed to be expandable to a 12.5 mgd plant of sixteen evaporative stages and 30 stages of feed heating. Discussed is the environmental planning wherein assessment of the environmental impact of the entire project was undertaken. Considered was the impact on the environment of existing similar plants in terms of noise, appearance, odors, and outfall characteristics. The initial construction activity was the site preparation. To meet seismic design conditions, the top ten feet of soil was removed and recompacted to 95% Proctor. The initial operations are in the low temperature recycle mode. Finally, the management program in the Orange County Water District is described. (Bell-Cornell) W75-06568

SYSTEM FOR DEMINERALIZING WATER BY ELECTRODIALYSIS,

For primary bibliographic entry see Field 5F. W75-06685

EVAPORATION SYSTEM AS FOR THE CON-VERSION OF SALT WATER, E. H. Schwartzman.

U.S. Patent No. 3,869,351, 5 p, 4 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 932, No 1, p 218, March 4, 1975.

*Patents, Descriptors: *Heat transfer, *Desalination, *Evaporation, Condensation, Refrigeration, Salt water, Fresh water, Evapora-

Identifiers: Compressors

A conversion system is described for evaporating salt water so as to produce fresh water. A quantity of salt water (liquid phase) is contained to receive heat and thereby evaporate a portion of such water to provide a gaseous phase. Heat is extracted from the gaseous phase resulting in condensed fresh

water. The system transfers heat energy to a working fluid to power a compressor structure in a refrigeration cycle, and supplying heat to the liquid phase. Compressor structures are disclosed in the forms of an ejector and a turbine compressor. The same working fluid is employed in the power cycle and the refrigeration cycle. Specific structures are described for obtaining greater efficiency including an arrangement for staging individual systems. (Sinha-OEIS) W75-06686

COLORADO RIVER SALINITY, NEW SOLU-TIONS TO AN OLD PROBLEM. For primary bibliographic entry see Field 5G. W75-06774

3B. Water Yield Improvement

WEATHER MODIFICATION ACTIVITIES IN

TEXAS, 1973, Texas Water Development Board, Austin. Weather Modification and Technology Div. Report 187, November 1974. 23 p, 1 tab.

Descriptors: *Weather modification, *Artificial rainfall, *Precipitation(Atmospheric), Meteorology, Cloud physics, Droughts, Cloud seeding, Hail, Rain, Silver iodide, Legal aspects, *Texas. Identifiers: Hail suppression, Rainfall augmenta-

During calendar year 1973, nine weather modifica-tion projects were conducted in Texas. These projects inculded seven operational cloud seeding projects, one precipitation management research project, and one rain augmentation evaluation project. In all cases the objectives of the cloud seeding projects were to increase rainfall, to decrease hailfall, or both. In all operational cloud seeding projects silver iodide was the seeding agent used to stimulate rainfall and/or suppress hailfall. Sodium chloride was used in the research project. Two methods of cloud seeding were utilized in Texas during 1973. One method was to attempt to introduce the seeding material into clouds from ground-based generators. This method is based on the premise that the seeding material is trans-ported from the ground to cloud base by the vertical component of the low level winds. The second cloud seeding method employed aircraft with silver iodide flares affixed to their wings to deliver the seeding material directly to the inflow region at cloud base. No attempt was made to analyze the degree of success of these activities. Clear-cut results are difficult to obtain and usually require that a given project continue for a number of years before quantifiable effects can be detected; however, there is great variability of natural weather phenomena in Texas. (Sims-ISWS) W75-06464

BACKGROUND SILVER CONCENTRATIONS IN ILLINOIS PRECIPITATION AND RIVER WATER.

Illinois State Water Survey, Urbana. For primary bibliographic entry see Field 5A. W75-06506

THE USE OF A VERTICALLY POINTING PULSED DOPPLER RADAR IN CLOUD PHYSICS AND WEATHER MODIFICATION STUDIES. Washington Univ., Seattle. Dept. of Atmospheric

R. R. Weiss, and P. V. Hobbs.

Journal of Applied Meteorology, Vol 14, No 2, p 222-231, March 1975. 8 fig, 2 tab, 8 ref. NSF Grant GI-31759; AFCRL Contract F19628-74-C-0066.

Descriptors: *Radar, *Cloud physics, *Weather modification, Instrumentation, Cloud seeding, Precipitation(Atmospheric), Turbulence, Ice,

WATER SUPPLY AUGMENTATION AND CONSERVATION—Field 3

Use Of Water Of Impaired Quality—Group 3C

Rime, Water vapor, Radiosondes, Washington, Data processing.

Identifiers: *Doppler effect, Doppler radar, Fall

speeds, Vapor deposition.

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It was shown that Doppler radar measurements of the changes with height of the average fallspeeds of solid precipitation particles can be used together with radiosonde data to distinguish between growth of ice particles by riming and growth by deposition from the vapor phase. Under some conditions this information can be deduced from real-time observations, but generally, spectral broadening by turbulence requires that the velocity measurements be time-averaged. Examples of the use of this technique to deduce information on the modes of growth of ice particles in natural and in artificially seeded clouds were given. (Jones-ISWS) W75-06507

OBSERVATIONS OF POTENTIAL ICE

Meteorological Research Inst., Tokyo (Japan). T. Kitagawa-Kitade, and H. Maruyama.
Papers in Meteorology and Geophysics, Vol 25, No 2, p 99-110, June 1974. 8 fig, 13 ref.

Descriptors: *Crystallization, *Instrumentation, Freezing, Lead, Iodine, On-site investigations, Measurement, Temperature, Ice, *Nucleation, *Weather modification.

Identifiers: *Ice nuclei, Lead iodide, Cold chamber, Millipore filter, Activation temperature, *Japan(Tokyo Karuizawa).

It was observed that potential ice nuclei, activated with the addition of iodine vapor to natural air, become highly active even at such a high temperature as minus 8C. Observations suggest that their concentration as well as that of natural ice nuclei increases exponentially along with the fall of activation temperature, although the former shows far steeper increase contrasted to the latter. The size of these potential ice nuclei is several 10th micron or less, which is observed by electron microscope. The Millipore filter was found to be much more useful than the cold chamber for com-parative observations, but it appears to take in iodine-activated nuclei at less than minus 12C, so due provisions have to be made for possible errors. The number of nuclei observed by means of the two methods is one order smaller for the filter method than for the cold chamber, this being as-cribed probably to the nuclei of exteme small size. In both Tokyo and Karuizawa, the variation of ice and the control of its control of it

RAIN--A WATER RESOURCE

Department of the Interior, Washington, D.C. Available from Superintendent of Documents, U.S. Govt. Printing Office, Washington, D.C. GPO:19730-525-709, for \$0.25. 1973. 7 p, 3 fig, 2

Descriptors: *Rainfall disposition, *Runoff, *Precipitation intensity, *Water supply, Water resources, Water requirements, Vegetation effects, Percolation, Overland flow, Groundwater, United States, Topography, Oceans, Lakes, Evapotranspiration, Evaporation, Water loss.

The amount of precipitation that falls around the world may range from less than 0.1 inch per year to more than 900 inches per year. What happens to water after it reaches the ground is dependent on the rate of precipitation, topography, soil, vegeta-tion, temperature, and the extent of urbanization. Direct runoff in an urbanized area is relatively great due to impermeable pavements and storm sewer systems. Seventy percent of the precipita-

tion in the United States returns to the atmosphere by evaporation and transpiration. The other thirty percent reaches a stream, lake, or ocean either by overland runoff or through the natural groundwater reservoir. Average annual streamflow in this country is approximately twelve-hundred billion gallons a day. Consumption runs about four hundred billion gallons a day. Atlanta, Georgia, for example, has some one-hundred and six billion gallons of precipitation each year. Water use is approximately twenty-six billion gallons yearly. Thus, if water from a year's precipitation could be collected and stored without evaporation loss, about four times the present population could be supplied. (Sperling-Florida) W75-06586

ANALYSIS OF PUMPING WELL NEAR A STREAM.

Arizona Univ., Tucson. For primary bibliographic entry see Field 4B. W75-06809

3C. Use Of Water Of Impaired **Ouality**

SALINITY IN WATER RESOURCES.

SALINITY IN WATER RESOURCES.

Proceedings of the 15th Annual Western Resources Conference, July 1973, edited by J. E. Flack and C. W. Howe, Merriman Publishing Company, Boulder, Colorado, 1974. \$10.00. OWRT X-137(9081)(1).

Descriptors: *Salinity, *Irrigation water, *Saline soils, *Water quality, *Salt tolerance, *Economic efficiency, *Economics, Financing, Planning, Evaluation, Decision making, Agriculture, Conjunctive use, Conservation, Cost-benefit analysis, Farm management, Input-output analysis, Land resources, Prices, Project planning, Resource allocation, Water demand, Legislation, Irrigation effects, Water rights, Irrigation efficiency, Optimization, Damages, *Colorado River Basin,

Current approaches to salinity control in the Colorado River are reviewed. New concepts re-garding greatly increased irrigation efficiencies approaching one hundred percent are given. A model is described capable of evaluating water quantity and quality resulting from management strategies of an integrated stream-aquifer system. An optimizing model for timing, quantity, and quality of irrigation applications is described. A review of methods for measuring agricultural damages from salinity is presented, emphasizing farm manage-ment techniques to deal with increasing salinity. Damage to urban water systems is studied. The importance and types of economic incentives needed to induce water conservation and salinity reducing measures are studied, with recommendations for a water rights purchase program to reduce salinity and facilitate water transfers. The importance of cost-sharing arrangements to the selection of leastcost abatement programs is reviewed. The importance of spotting bottleneck gaps in knowledge and directing research to those issues is emphasized. (See W75-06367 thru W75-06375)

CURRENT APPROACHES AND ALTERNA-TIVES TO SALINITY MANAGEMENT IN THE COLORADO RIVER BASIN,

au of Reclamation, Denver, Colo. J. T. Maletic.

In: Proceedings of the 15th Annual Western Resources Conference, July, 1973, University of Colorado, Boulder, Merriman Publishing Co., Boulder, 1974. p 11-29, 3 fig, 3 tab, 10 ref.

Descriptors: *Colorado River Basin, *Salinity, *Watershed management, Arizona, Utah, Colorado, Wyoming, New Mexico, California, Nevada, Pollution abatement, Water pollution, Saline water, Irrigation, Irrigation practices,

Approaches currently being incorporated into plans for dealing with the salinity problem in the Colorado River Basin are summarized. Salinity control in the Colorado River Basin, when integrated into an over-all basin management plan, can prevent the costly increases in salinity anticipated from continuing economic growth in the basin. To be implementable, the plan will need to be socially, politically, economically, and ecologically acceptable as well as physically sound. In the Colorado River system, the basin management concept provides a more viable approach to salini-ty control than singular application of the complete water reuse concept. (See also W75-06366) (Bowden-Arizona)

IMPLICATIONS OF INCREASING FIELD IR-RIGATION EFFICIENCY, Agricultural Research Service, Riverside, Calif.

Salinity Lab

J. van Schilfgaarde.

In: Proceedings of the 15th Annual Western Resources Conference, July, 1973, University of Colorado, Boulder, Merriman Publishing Co., Boulder, 1974. p 30-35.

Descriptors: *Irrigation efficiency, *Salinity, *Leaching, *Water conservation, *Salt tolerance, Irrigation practices, Saline water, Pollution abatement, Costs, Soil management, Colorado River Basin, Evapotranspiration control, Economics, Crop response, Return flow

Irrigated agriculture has been put on the defensive by the new national goals of ending discharge of pollutants into navigable streams by 1985, and by debate over whether such agricultural crop yields justify the national expense in water delivery systems and water quality projects. One way to lower the amount of salt in discharge water from irrigation fields is to lower the amount of water used in irrigating the fields. This will require developing plants with higher salt tolerance, exact monitoring of water delivery to the fields, and overall management of such agricultural tracts. Field experiments are now underway to test the validity of radically lowering leaching water in irrigated agriculture. This practice, by raising water efficiency, could significantly lengthen the life of irrigated fields, and perhaps even establish an equilibrium. (See also W75-06366) (Bowden-Arizona)

A WATER QUALITY MODEL TO EVALUATE WATER MANAGEMENT PRACTICES IN AN IRRIGATED STREAM-AQUIFER SYSTEM, Geological Survey, Denver, Colo.

For primary bibliographic entry see Field 5G. W75-06369

ECONOMIC ANALYSIS OF OPTIMAL USE OF SALINE WATER IN IRRIGATION AND THE EVALUATION OF WATER QUALITY,

Hebrew Univ., Jerusalem (Israel). Dept. of Agricultural Economics.

D. Yaron.

D. Yaron.

In: Proceedings of the 15th Annual Western
Resources Conference, July, 1973, University of
Colorado, Boulder, Merriman Publishing Co.,
Boulder, 1974. p 60-85, 40 ref, 1 tab, 7 fig.

Descriptors: *Salinity, *Economic justification, *Cost-benefit analysis, *Saline water, *Irrigation efficiency, Irrigation practices, Economics, Pollution abatement, Irrigation water quality, Water utilization.

While the biological and agricultural aspects of salinity have been extensively studied, little attention has been paid to the economic aspects of the

Field 3—WATER SUPPLY AUGMENTATION AND CONSERVATION

Group 3C—Use Of Water Of Impaired Quality

problem. The basic physical relationships involved in irrigation with saline water are reviewed, and an economic analysis is made on the microlevel (single crop, single farm) in the short and long run. An attempt is made to translate the implications of the analysis from the micro to the macro level. (See also W75-06366) (Bowden-Arizona) W75-06370

EVALUATING AGRICULTURAL EFFECTS OF SALINITY ABATEMENT PROJECTS IN THE COLORADO RIVER BASIN: AGRONOMIC AND ECONOMIC CONSIDERATIONS,

Colorado State Univ., Fort Collins. Dept. of Economics. For primary bibliographic entry see Field 5G.

W75-06371

THE IMPORTANCE OF SALINITY IN URBAN

WATER MANAGEMENT, Culp, Wesner, Culp Clean Water Consultants, Corona Del Mar, Calif. G. M. Wesner.

In: Proceedings of the 15th Annual Western Resources Conference, July 1973, University of Colorado, Boulder, Merriman Publishing Co., Boulder, 1974. p 108-119, 3 fig, 1 tab, 1 ref

Descriptors: *Colorado River, *Urban hydrology, Desaination, *Saline water intrusion, *Water importing, Saline water, Groundwater, *California, Salinity, Groundwater mining, Overdraft, Groundwater recharge, Forecasting, Economic justifica-

Identifiers: *Orange County(Calif)

Orange County, California, has a growing salinity problem in its water supply. Various options are examined which promise to alleviate this situation. In the past, excessive pumping of groundwater has led to a sea water intrusion. Current plans call for recharging the water table with higher quality water, and for a desalting facility to process Colorado River water. It is estimated that the adverse salt balance in Orange County will be corrected by 1990. In the interim, water quality improvement programs will upgrade water available to the public. (See also W75-06366) (Bowden-Arizona) W75-06372

ECONOMIC INCENTIVES FOR SALINITY REDUCTION AND WATER CONSERVATION IN THE COLORADO RIVER BASIN,

Colorado Univ., Boulder. Dept. of Economics.

Co. W. Howe, and D. V. Orr.

In: Proceedings of the 15th Annual Western Resources Conference, July 1973. University of Colorado, Boulder, Merriman Publishing Co., Boulder, 1974. p 120-138, 5 tab, 5 fig, 8 ref.

Descriptors: "Saline water, "Colorado River Basin, "Water allocation(Policy), "Water rights, Saline water, Arizona, Utah, Wyoming, Colorado, New Mexico, Nevada, California, Pollution abate-ment, Fossil fuels, Water demand, Economic efficiency, Water resources development, Water conservation.

The Colorado River Basin, particularly the Lower Basin, is facing future water shortages and a growing salinity level. Reductions in consumptive use and improvements in water quality in the Upper Basin would be desirable from the Lower Basin viewpoint. Whether such changes would be desirable from the Upper Basin viewpoint would depend on the methods used to accomplish such change, the incidence of costs of these methods, and the extent to which compensation might be paid. The more recent emergence of huge potential energyrelated demands for water simply increases con-sumptive uses and salinity problems. Such developments increase the importance of finding additional steps in the Upper Basin for reducing salt and conserving water. The evaluation of alternative approaches to salinity and water quantity problems is considered, and economic incentives or disincentives are examined in light of their ability to induce water saving and salinity reduction. Concrete recommendations are made for a water rights purchase program which could greatly assist in the efficient reallocation of water and reduction of salinity. Preliminary estimates of the program's costs are made. (See also W75-06366) (Bowden-W75-06373

COST SHARING AND EFFICIENCY IN SALINI-TY CONTROL.

National Bureau of Standards, Washington, D.C. **Building Economics Section.** H. E. Marshall.

In: Proceedings of the 15th Annual Western Resources Conference, July 1973, University of Colorado, Boulder, Merriman Publishing Co., Boulder, 1974. p 139-152, 1 fig, 14 ref.

Descriptors: *Colorado River Basin, *Salinity, *Cost sharing, *Economics, *Cost allocation, Arizona, New Mexico, Utah, California, Nevada, Colorado, Wyoming, Saline soils, Water pollution, Saline water, Irrigation water, Pollution abate-ment, Water quality control, Federal Project Pol-

There are no established cost-sharing rules for salinity control as a distinct project purpose. Unless such rules are legislated, cost-sharing is likely to be haphazard and unfair. One recommendation is that the federal government share the total life cycle costs (construction, operation, maintenance) of all salinity projects with a fixed contribution. This will force non-federal interests to select the cheapest feasible salinity control system. Beneficiaries of salinity control projects should pay in proportion to their benefits from the project. Upstream users must be charged in proportion to their pollution of water used by downstream users. Present state, federal, and institutional arrangements will complicate implementation of such charges. Also, such a distribu-tion of salinity costs to those who benefit most from such abatement will result in high charges to irrigators. (See also W75-06366) (Bowden-Arizona) W75-06374

FINDING KNOWLEDGE GAPS: THE KEY TO SALINITY CONTROL SOLUTIONS.

Colorado State Univ., Fort Collins. Environmental Resources Center. For primary bibliographic entry see Field 5G. W75-06375

PRELIMINARY STUDIES ON QUALITY OF UN-DERGROUND WATERS ON GROWTH AND YIELD OF COCONUT (COCOS NUCIFERA), Regional Research Station, Mudigere (India). D. S. Kulkarni, P. A. Saranmath, and P. B.

Mysore J Agric Sci Vol 7, No 1, p 122-124, 1973.

Descriptors: *Saline water, Effects, *Plant growth, Salinity, Sodium, Sulfates, *Water quali-

Identifiers: Coconut. Cocos-nucifera

The effects of salinity and Na from 15 Indian coconut groves on coconut yield were tested. High sulfate coupled with high salt was harmful but no ill effects were noted with waters of moderate salinity.--Copyright 1974, Biological Abstracts, Inc. W75-06466

PRACTICAL APPLICATIONS FOR REUSE OR WASTEWATER,

Los Angeles County Sanitation District, Calif.

J. D. Porkhurst, C. W. Carry, A. N. Masse, and J. N. English.

In: Chemical Engineering Progress, Symposium Series, Vol 64, No 90, 1968. p 225-231, 4 tab, 1 fig.

Descriptors: *Sewage effluents, *Water reuse, *Water sources, *Recharge, *Waste water disposal, Water utilization, Reclaimed water, Tertiary treatment, Water conservation, California, Irrigation practices, Industries, Water supply.

In the foreseeable future the major reuse of renovated water will consist of groundwater recharge, irrigation, recreation, and industrial applications. Water of varying quality will be required in each of these applications, and tertiary treatment of the secondary effluent produced by activated sludge plants may be required in certain cases. Percolation of renovated water through the soil to a domestic groundwater supply has proved to adequately protect the public health. The small quantities of residual solids, organics, and bacteria remaining in the treated water are filtered and ad-sorbed by the first few feet of the soil layer. Secondary effluent of domestic origin is normally of acceptable quality for irrigation of field crops. As opposed to the water used for irrigating the land in recreational parks, water which would be reused in recreational lakes would require tertiary treatment. The use of renovated water for industrial purposes has proven more complex than other applications. The difficulty is due to widely varying quality requirements for specific industrial applications. To develop specific tertiary treatment processes for the removal of selected refractory components of secondary effluents, a research program has been conducted. The program has in-vestigated both organic and inorganic removal. These methods include carbon adsorption, reverse osmosis, ion exchange, and electrodialysis. (Poertner) W75-06659

ROLE OF VEGETATION IN THE PROCESSES OF SALT ACCUMULATION, (IN RUSSIAN), Akademiya Nauk Kazakhskoi SSR, Alma-Ata. In-

stitut Pochvovedeniya. N. F. Mozhaytseva.

Izv Akad Nauk Kaz SSR Ser Biol. 1. p 10-15, 1973,

Identifiers: Aeluropus-sp, Calcium, Carbonates, Cenoses, Chlorides, Echinopsilon-sp, Halophytes, Ions, Magnesium, Potassium, Reeds, Roots, Salinity, *Salts, Saltwort, Sodium, Soil profiles, Sulfates, *Vegetation, Wormwood, Absorption, *Salt tolerance(Plants), *USSR(Syridar'i River delta).

Selective absorption of salt-forming elements by plants (Aerulgous sp., Echinopsilon sp., worm-wood, salt wort, common weed) and participation of phytofactors in the redistribution of salts in the soil profile were studied in the Syridar'i River delta (Kazahkstan, Ca++Mg++,K+/Na+,Ca++ Mg++/K+ + Na+, Cl/SO4(-2), Ca++ Mg++/Cl(-) + SO4(-2), Ca++ Mg++/HCO3(-) were determined in 11 types of soil in the presence of numerous types of vegetation. Increased salinity of soils is accompanied by an increase in the percentage of water-soluble salts among salt-forming elements in vegetation. There is no direct proportionality among the various ions found in soil. The capacity of plants for selective accumulation is explained on the basis of biochemical characteristics: chemi-cal properties of soil and ground water play a subordinate role. Aerial organs of plants differ significantly in qualitative composition of salt forming elements: the ratios between absorbed elements are characteristically stable in root systems. The main plant groups in the delta region do not alter the salinity of the soil by means of the biological cycle. Halophyte communities stabilize the con-centrations of salt-forming elements to some extent. Grassy cenoses tend to accumulate Ca salts in the upper soil layers.--Copyright 1974, Biological Abstracts, Inc. W75-06671

WATER SUPPLY AUGMENTATION AND CONSERVATION—Field 3

Conservation In Agriculture—Group 3F

DIGESTED SLUDGE DISPOSAL AT SAN DIEGO'S AQUATIC PARK, San Diego Dept. of Utilities, Calif. For primary bibliographic entry see Field 5E. W75-06674

3D. Conservation In Domestic and **Municipal Use**

CONTROL IN COMMUNITY FLOOD PLANNING. California Univ., Berkeley. Dept. of Landscape

Architecture. For primary bibliographic entry see Field 6B.

W75-06429

THE EFFECTS OF DIMINISHED GROUND-WATER SUPPLIES ON SELECTED NEW HAMPSHIRE INDUSTRIES: AN ECONOMIC AND LEGAL EVALUATION, New Hampshire Univ., Durham. Water Resource

Research Center. For primary bibliographic entry see Field 4B. W75-06463

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KALAMAZOO COUNTY, MICHIGAN, WATER

QUALITY STUDY.
Jones and Henry, Toledo, Ohio.
For primary bibliographic entry see Field 5G. W75-06759

MANAGEMENT IMPROVEMENT,

Jacksonville Dept. of Public Works, Fla. Water and Sewer Div. For primary bibliographic entry see Field 5D. W75-06760

WATER AND SEWER SYSTEMS PROGRAM AND DEVELOPMENT, FIVE-YEAR CAPITAL IMPROVEMENT PLAN: OCTOBER 1, 1972 -SEPTEMBER 30, 1977, Jacksonville Dept. of Public Works, Fla.

For primary bibliographic entry see Field 5D. W75-06762

CLEAN WATER . . . A NEW DAY FOR SOUTHEAST MICHIGAN, Detroit Metro Water Dept., Mich. For primary bibliographic entry see Field 5D. W75-06763 W75-06763

PROSPECTUS FOR REGIONAL SEWER AND WATER PLANNING. Southwestern Wisconsin Regional Planning Com-

mission, Platteville. For primary bibliographic entry see Field 5D. W75-06782

URBAN SYSTEMS ENGINEERING DEMON-STRATION PROGRAM FOR HINDS, MADIS-ON, RANKIN COUNTIES, MISSISSIPPI, VOLUME I: AREA-WIDE WATER SYSTEMS. Clark, Dietz and Associates, Inc., Jackson, Miss For primary bibliographic entry see Field 5D.

URBAN SYSTEMS ENGINEERING DEMONSTRATION PROGRAM FOR HINDS, MADISON, RANKIN COUNTIES, MISSISSIPPI, VOLUME II: AREA-WIDE SANITARY SEWER SYSTEM.

Clark, Dietz and Associates, Inc., Jackson, Miss. For primary bibliographic entry see Field 5D. W75-06784

URBAN SYSTEMS ENGINEERING DEMON-STRATION PROGRAM FOR HINDS, MADIS-

RANKIN COUNTIES, MISSISSIPPI, VOLUME IV. AREA-WIDE STORM DRAINAGE AND FLOOD PLAIN MANAGEMENT STUDIES. Clark, Dietz and Associates, Inc., Jackson, Miss. For primary bibliographic entry see Field 5D. W75-06785

3E. Conservation In Industry

THE WESTERNPORT BAY ENVIRONMENTAL

Victoria Ministry for Conservation, Melbourne (Australia). Westernport Bay Environmental

For primary bibliographic entry see Field 6G. W75-06555

ENVIRONMENTAL CONTAMINANTS INVEN-TORY STUDY NO. 2 - THE PRODUCTION, USE DISTRIBUTION OF CADMIUM IN CANADA,

Canada Centre for Inland Waters, Burlington (Ontario). For primary bibliographic entry see Field 5B.

W75-06742

3F. Conservation In Agriculture

AGRICULTURAL DROUGH PROBABILITIES IN TENNESSEE,

Tennessee Univ., Knoxville. Dept. of Plant and

Soil Science. J. M. Safley, Jr., and W. L. Parks.

Available from the National Technical Informa-tion Service, Springfield, Va 22161 as PB-240 977, \$4.25 in paper copy, \$2.25 in microfiche. University of Tennessee, Agricultural Experiment Station, Bulletin 533, August 1974. 65 p, 52 tab, 19 ref. OWRT A-017-TENN(4). 14-31-001-3843.

Descriptors: *Droughts, Precipita-tion(Atmospheric), *Weather data, *Tennessee, *Probability, *Drought resistance, Trees, *Crop response, Computer programs, Data collections, Crop production.

A long-term weather file consisting of sixty-seven select stations has been established for Tennessee. Precipitation probabilities for 1-, 2-, 3- and 4-week periods have been calculated using the incomplete gamma distribution; these data are being published. There are computer programs to calculate temperature extremes and means, to calculate psychrometric data, to calculate precipitation probabilities, weekly/monthly means, and intensity frequencies, to calculate evapotranspiration by a modified Thornthwaite model and by the Pen-man formula, and to calculate the Palmer Drought Index. Collection of statewide crop yield data is almost complete and the analysis of tree growth patterns by annual-ring width has begun. Work is in progress toward calculation of drought probabilities on a 1-week, 2-week, and a monthly basis for the State. Relation of crop yield data and tree growth to drought intensity will be performed by multiple regression techniques and yield predictors for the crops will be derived. W75-06358

RECYCLING OF SEWAGE EFFLUENT BY IR-RIGATION: A FIELD STUDY ON OAHU, SECOND PROGRESS REPORT FOR JULY 1972 TO JULY 1973.

Hawaii Univ., Honolulu. Water Resources Research Center.

For primary bibliographic entry see Field 5D. W75-06361

ATTITUDES TOWARD WATER USE PRACTICES AMONG S.E. IDAHO FARMERS: A

STUDY ON ADOPTION OF IRRIGATION SCHEDULING,

Idaho Univ., Moscow. Dept. of Agricultural and Forest Economics. J. Carlson

Idaho Water Resources Research Institute, Moscow, Technical Completion Report, January 1975. 39 p, 15 tab, 3 ref, append. Supported by Bureau of Reclamation.

Descriptors: *Irrigation practices, Management, *Water utilization, *Attitudes, Social values, *Idaho, Social aspects, Agriculture, Irrigation systems, Sprinkler irrigation. Identifiers: *Irrigation scheduling.

Attitudes of Southern Idaho farmers toward the adoption of an irrigation scheduling program were measured. An interview survey of approximately 50% of the farmers in the A and B District provided data on the socioeconomic characteristics of farmers and attitudes toward their water use patterns. The findings pointed to several significant factors affecting the involvement of a farmer in the irrigation scheduling program. Those farmers having cooperative arrangements with relatives were less likely to utilize irrigation scheduling; while those who perceived that they had irrigation problems were more receptive. This finding sug-gests that unique social forces have an influence on the adoption of a new idea. Finally, farmers tended to feel that irrigation scheduling was ap-propriate for sprinkler irrigation systems but not for open ditch systems. While not entirely true, it suggests that irrigation scheduling fits into some farm operations better than others. This factor may be important in considering future areas for expansion of an irrigation scheduling program.

EFFECT OF SHELTER AND WATER-SPRIN-KLING DURING SUMMER AND AUTUMN ON SOME PHYSIOLOGICAL REACTIONS OF MURRAH BUFFALO HEIFERS,

Haryana Agricultural Univ., Hissar (India). Dept. of Livestock Production and Management. N. S. R. Sastry, C. K. Thomas, V. N. Tripathi, R. N. Pal, and L. R. Gupta. Indian J Anim Sci. Vol 43, No 2, p 95-99, 1973.

Descriptors: *Sprinkling, *Animal physiology, Effects, Stress, Tension stress relieving. Identifiers: Buffalo, Shelter, Hot weather,

The effect of shelter and water-sprinkling during hot (April 1971-July 1971) and mild (end of April 1971-Oct. 1971) seasons on rectal temperature, pulse rate and respiration rate of growing Murrah buffalo heifers was investigated. Provision of shelter and water-sprinkling significantly reduced thermal strain experienced by the animals and aided them in maintaining a high metabolic rate as evidenced by rectal temperature and pulse rate at 9 am. The physiological apparatus of the animals was under greater stress during the hot than during the mild season. Buffalo heifers may be given pro-tection from direct solar radiation by simple sunshades and may be sprinkled with water during hot summer and mild autumn seasons to alleviate the thermal stress from an adverse environment.--Copyright 1974, Biological Abstracts, Inc. W75-06401

THE QUANTITATIVE EFFECTS OF TWO METHODS OF SPRINKLER IRRIGATION ON THE MICROCLIMATE OF A MATURE AVOCADO PLANTATION, Israel Meteorological Service, Bet-Dagan. Div. of

Agricultural Meteorology. J. Lomas, and M. Mandel.

Agric Meteorol. Vol 12, No 1, p 35-48, 1973, Illus.

Descriptors: *Sprinkler irrigation, Irrigation practices, Plants, *Weather modification, Arid climates Identifiers: *Avocado, Microclimatic modifica-

tion. Sharay conditions

Field 3—WATER SUPPLY AUGMENTATION AND CONSERVATION

Group 3F-Conservation In Agriculture

The effects of above- and below-canopy irrigation on microclimatic amelioration of an avocado plantation during hot and dry (sharav) conditions were investigated. Above-canopy irrigation has the greatest effect on microclimatic modification reducing temperatures by 7C and increasing humidity by 27%. Below-canopy irrigation has a much lesser effect. The effect of irrigation on microclimatic modification is relatively short lived, both methods of irrigation showing similar results. Microclimatic modifications are them-selves climatically dependent. The more extreme 'sharav' conditions, the hotter and drier the ambient air, the greater the modifying effects. Practical considerations prevent large-scale irrigarracucal considerations prevent large-scale irriga-tion above the tree-canopy and consequently below-canopy irrigation is practiced. Under field conditions the actual rate of cooling remains ap-proximately 1/3 of the wet bulb depression.— Copyright 1974, Biological Abstracts, Inc. W75-06428

EFFECT OF SOIL WATER POTENTIAL ON DISEASE INCIDENCE AND OOSPORE GER-MINATION OF PYTHIUM NIDERMATUM,

Arizona Univ., Tucson. Dept. of Plant Pathology. For primary bibliographic entry see Field 2G. W75-06447

ECOLOGICAL AND PHYSIOLOGICAL IMPLI-CATIONS OF GREENBELT IRRIGATION, PROGRESS REPORT OF THE MALONEY CANYON PROJECT-1974,

California Univ., Riverside. Dept. of Plant Sciences. For primary bibliographic entry see Field 5D.

W75-06461

RESEARCH ON WATER RESOURCES EVALUATION METHODOLOGY, A RIVER BASIN ECONOMIC AND FINANCIAL POST-AUDIT

Little (Arthur D.), Inc., Cambridge, Mass. For primary bibliographic entry see Field 6B. W75-06524

WATER TABLE POSITION AS AFFECTED BY SOIL AIR PRESSURE.

Agricultural Research Service, Reno, Nev. For primary bibliographic entry see Field 4B. W75-06549

A PROTOTYPE OF THE MODERN SETTLING-RESERVOIR IN ANCIENT MESOPOTAMIA, Illinois Univ., Urbana. World Hertiage Museum. For primary bibliographic entry see Field 4A. W75-06565

PROPELLING SHOE FOR USE IN AN IRRIGA-TION SYSTEM.

L. J. Dowd.

U.S. Patent No. 3,866,835, 5 p, 14 fig, 5 ref; Official Gazette for the United States Patent Office, Vol 931, No 3, p 1178, February 18, 1975.

Descriptors: *Patents, *Irrigation systems, *Water distribution(Applied), *Surface irrigation, Equipment, Distribution systems, Pipes, Application equipment, Conservation. Identifiers: Propelling shoes

An irrigation system includes an above ground, moving elongated water distribution pipe. The pipe is pivotally supported at one end, and spaced movable members support the pipe between the pivoted end and the opposite end. Drive means pivot the pipe about the support. The drive in-cludes propelling shoes on the movable support and they engage the ground to assist in pivoting the pipe. Each shoe includes a planar lower plate hav-ing a surface which is slidable along the ground.

An aperture is provided in the planar plate. A drive shaft is interconnected to the shoe and is pivotal relative to the shoe, between first and second anregarde to the snoe, between this and second second the drive shaft. The drive cleat includes a planar portion which is passed through the aperture in the planar plate of the shoe. The drive cleat is movable, in response to the movement of the drive shaft, between a ground disengaged position when the shaft is at the first angular position, and a max-imum ground penetrating condition when the drive shaft is at the second angular position. (Sinha-W75-06697

THE RELATIONSHIP BETWEEN THE DM (DRY MATTER) CONTENT OF HERBAGE FOR SILAGE MAKING AND EFFLUENT PRODUC-TION.

Hannah Dairy Research Inst., Ayr (Scotland). For primary bibliographic entry see Field 5B. W75-06725

NUTRIENT UPTAKE BY RICE UNDER DIF-FERENT SOIL MOISTURE REGIMES, Haryana Agricultural Univ., Hissar (India). Dept.

of Soils. S. M. Gorantiwar, I. K. Jaggi, and S. S. Khanna. J Indian Soc Soil Sci. Vol 21, No 2, p 133-136,

1973.

Identifiers: Crops, Iron, *Nutrients, Phosphorus, Potassium, *Rice, Soil moisture, Sulfur, Potassium, Absorption, India.

A pot experiment was conducted in kharif 1969-70 to study the effect of 5 soil moisture levels on yield and uptake of nutrients by 3 varieties of rice in medium black soil of Jabalpur(India). The differences among the uptake values of P, K, S and Fe in the 3 varieties were non-significant. Differences in the yield and uptake of nutrients due to varying moisture regimes were significant. Rice grown under submergence yielded significantly more than at other moisture levels. There was no significant difference between the grain and straw yields under 4 cm and 7 cm of flooding. The uptake of P and K was significantly increased in 4 cm of submergence over all the other treatments and followed the order: 7 cm of submergence > 0 cm of water tension > 300 cm of water tension > 700 cm of water tension. The same trend was observed in the uptake of Fe and S but the difference between the uptake values of Fe and S was non-significant in 4 cm and 7 cm of submergence. The residual availability of P, K and S in soil at post harvest was found more in 300 and 700 cm of water tension as compared to 0 cm of water tension and submergence. The reverse trend was found with the residual availability of Fe.--Copyright 1974, Biological Abstracts, Inc. W75-06726

EFFECT OF MIDTERM DRAINAGE ON YIELD AND FERTILIZER NITROGEN USE EFFICIEN-CY ON TWO HIGH YIELDING VARIETIES OF RICE,

Indian Agricultural Research Inst., New Delhi. Nuclear Research Lab.

G. S. Upadhya, and N. P. Datta.
J Indian Soc Soil Sci. Vol 21, No 2, p 219-226,

Identifiers: Ammonium sulfate, Drainage, *Fertilizer, Flooding, *Nitrogen, *Rice, Urea, *Crop yield, India.

A field experiment was carried out in kharif season at the Indian Agricultural Research Institute farm, New Delhi, to assess the effect of midterm drainage on yield and fertilizer N use effimoterm drainage on yield and tertuitzer N use etri-ciency on rice using 15N labeled sources on 2 high yielding varieties of rice (Padma and IR-22). (NH4)2SO4 and urea were similar in their effect on grain and straw yield. Continuous flooding was better than midterm drainage treatment. Varietal differences were significant in yield. Percentage

utilization of fertilizer N was more under continuous flooding than under midterm drainage. It was more in (NH4)2SO4 than in urea treatment. Varieties differed in their utilization of fertilizer N. Utilization of fertilizer N was more at primordial initiation stage than at transplanting.--Copyright 1974, Biological Abstracts, Inc. W75-06727

COMPARED EVAPOTRANSPIRATION VARIOUS CROPS AND STUDY OF WATER-CONSUMPTION RATES,

Institut National de la Recherche Agronomique, Toulouse (France). Station d'Agronon For primary bibliographic entry see Field 2D. W75-06728

A SENSITIVE RECORDING LYSIMETER, Agricultural Research Inst., Cedara (South Africa).

For primary bibliographic entry see Field 2D. W75-06729

CHANGE IN THE MICROCLIMATE OF THE AIR LAYER NEAR THE SOIL FOLLOWING SPRINKLING COTTON WITH WATER, A. I. Efanova.

Izv Akad Nauk Tadzh SSR Otd Biol Nauk. 2, p 14-18, 1973, Illus, (In Russian).

Identifiers: Air, Climates, *Cotton, Humidity, *Microclimates, Soils, *Sprinkling irrigation, Temperature, *USSR(Tadzhikistan-Gissar Val-

Experiments were carried out in the Gissar valley of Tadzhikistan (USSR) in 1964-1966 to establish the optimal rate of water when sprinkling cotton and to study the effect of irrigation on the microclimate of the surface boundary layer and yield. The relative humidity of the surface boundary layer from overhead watering of the plants increased both with respect to individual observations during the day and to periods of development within limits from 4 to 19%. Sprinkling at a rate of 1500 and 2000 1/ha/sprinkling at the phase of budding, mass flowering, and fruit formation lowered the air temperature at the level of the plants in the early afternoon (1-2 p.m.) an h after sprinkling by 0.5-4.3C in July and Aug. and increased it by 0.9-2.7 deg in the evening hours. Overhead watering of cotton during critical periods created a favorable microclimate at the level of the plants, which promoted an increase of prefrost harvests by 1.5-4.9 cent/ha and total yield by 1.3-2.3 cent/ha. The best rate for 3-fold sprinkling is 1500 1/ha/sprinkling. On the average for the 3 yr the increment of the prefrost harvest was 4.9 cent/ha and of the total harvest 2.3 cent/ha... Copyright 1974, Biological Abstracts, Inc. W75-06730

ANALYSIS OF PUMPING WELL NEAR A

STREAM, Arizona Univ., Tucson. For primary bibliographic entry see Field 4B. W75-06809

DYNAMICS OF CONTENT OF CAROTENOIDS AND CHLOROPHYLLS IN THE UPPER LEAVES OF WHEAT AND BARLEY DURING THE CRITICAL PERIOD OF WATER DEFI-CIENCY IN SOILS, (IN RUSSIAN), Vsesoyuznyi Institut Rastenievodstva, Leningrad

O. B. Motkalyuk.

O. B. Motkayuk.
Fiziol Rast, Vol 20, No 6, p 1242-1247, 1973. Illus. Identifiers: *Barley, *Carotenoids, *Chlorophylls, Dynamics, Embryo, Leaves, Meiosis, Mitosis, Phytochrome, Soils, Spores, Stamen, Vegetation, Water deficiencies, *Wheat.

The development of the embryonic ear during 7 vegetative periods was studied. Earlier data on the

WATER QUANTITY MANAGEMENT AND CONTROL-Field 4

Control Of Water On The Surface—Group 4A

presence of an early maximum of phytochrome accumulation (at the beginning of active growth and on a decrease of phytochrome content during the reproductive period were confirmed. The 1st maximum of the pigment content in the leaves was registered prior to a period critical to water deficiency in soil, during the stamen formation or the formation of pollen parent cells in them. A decrease in the content of phytochromes coincides with 2 moments in the critical period: the appearance and differentiation of pollen parent cells before meiosis; the formation and vacuolization of mononuclear microspores before the 1st mitosis.—Copyright 1974, Biological Abstracts, Inc. W75-06841

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

LAND-USE ISSUES: PROCEEDINGS OF A CONFERENCE.

Virginia Polytechnic Inst. and State Univ., Blacksburg. Water Resources Research Center. Available from the National Technical Information Service, Springfield, Va 22161 as PB-2449 974, 55.75 in paper copy, \$2.25 in microfiche. Publication 629, Cooperative Extension Service, November 1974. 112 p. Edited by M. J. Poxton and P. M. Ashton.

Descriptors: *Land use, *Virginia, Land management, Standards, Water quality, Flood plains, Legislation, Planning, Water policy, Attitudes, Zoning, Legal aspects, Urbanization, Land resources, Institutional constraints.

Fifteen papers presented before a conference on land-use issues in Virginia, plus two additional papers, are included in this Virginia-oriented publication. The in-place land-use legislation, the planning process, the approaches to land-use policy, the application of land-use controls, water and water quality policy, and the impact of citizen attitudes on land use are discussed. Special issues treated include standards for implementing comprehensive plans, alternatives to zoning, rural and urban conflicts, flood-plain management, impacts of new communities, and methods of designating land for special purposes, such as agricultural and environmental districts.

HYDROGEOLOGY AND WATER QUALITY MANAGEMENT,

Moody and Associates, Inc., Harrisburg, Pa. Environmental Services Div.

For primary bibliographic entry see Field 5G. W75-06400

REPORT TO THE SONOMA CREEK ADVISORY COMMITTEE, SONOMA, CALIFORNIA, California Univ., Berkeley. Dept. of Landscape Architecture.

For primary bibliographic entry see Field 6B. W75-06430

CHARACTERISTICS OF WYOMING STOCK-WATER PONDS AND DIKE SPREADER SYSTEMS, Wyoming Univ., Laramic. Water Resources

Wyoming Univ., Laramie. Water Resources Research Inst. V. E. Smith.

Water Resources Series No. 47, July 1974. 41 p, 8 fig. 2 tab. 16 ref.

Descriptors: *Stock water, Ponds, Streamflow. *Beneficial use, Dikes, Evaporation, Hydrology,

Precipitation(Atmospheric), Runoff, Water rights, *Wyoming.

Identifiers: Capacity curves, *Dike spreaders.

Based on information from available studies, and hydrologic processes related to Wyoming stock-water ponds and dike spreader systems. Capacity curves for various configurations of stock-water ponds were developed and maps of average annual evaporation, precipitation and runoff were compiled. The amount of water constituting beneficial use was examined and recommendations relative to water rights administration were presented. W75-06433

TEMPERATURE EFFECTS ON GREAT LAKES WATER BALANCE STUDIES,

State Univ. of New York, Buffalo. Dept. of Civil Engineering.

For primary bibliographic entry see Field 2H. W75-06448

DEVELOPMENT OF A STORM RUN-OFF PRE-DICTION MODEL WITH SIMULATED TEM-PORAL RAINFALL DISTRIBUTION, Meteorological Office, New Delhi (India). For primary bibliographic entry see Field 2E. W75-06453

ADAPTATION AND APPLICATION OF THE KARAZEV METHOD TO THE RATIONALIZATION OF QUEBEC'S HYDROMETRIC BASIC NETWORK.

National Inst. of Scientific Research, Quebec. For primary bibliographic entry see Field 2E. W75-06454

A COMPARISON OF HYDROLOGIC AND HYDRAULIC CATCHMENT ROUTING PROCEDURES,

University Coll., Galway (Ireland). For primary bibliographic entry see Field 2E. W75-06456

RELATIONS BETWEEN PLANIMETRIC AND HYPSOMETRIC VARIABLES IN THIRD-FOURTH-ORDER DRAINAGE BASINS,

New Univ. of Ulster, Coleraine (Northern Ireland). School of Biological and Environmental Studies.

For primary bibliographic entry see Field 2A. W75-06459

RESERVATION, RESERVOIR AND SELF-DETERMINATION: A CASE STUDY OF RESERVOIR PLANNING AS IT AFFECTS AN INDIAN RESERVATION,

Mississippi State Univ., Mississippi State. Dept. of Anthropology. For primary bibliographic entry see Field 6B.

W75-06462

SAN LUIS UNIT, TECHNICAL RECORD OF DESIGN AND CONSTRUCTION - VOLUME II, DESIGN, SAN LUIS DAM AND PUMPING-GENERATING PLANT, O'NEILL DAM AND PUMPING PLANT,

Bureau of Reclamation, Denver, Colo. For primary bibliographic entry see Field 8A. W75-06468

LONG-RANGE WATER SUPPLY PROBLEMS, PHASE I.

Kansas Water Resources Board, Topeka. For primary bibliographic entry see Field 6D. W75-06473 JACKSON HOLE FLOOD CONTROL PRO-JECT.

Committee on Channel Stabilization (Army). Available from the National Technical Information Service, Springfield, Va 22161 as AD-777 796, \$3.25 in paper copy, \$2.25 in microfiche. Technical Report 11, March 1974, 13 p.

Descriptors: *Flood control, *Stream stabilization, *Levees, Flood plains, Riprap, Erosion, Sedimentation, Braiding, Bank stability, Channels, Rivers, *Wyoming. Identifiers: Snake River, Jackson Hole(Wyo).

At the 28th meeting of the Committee on Channel Stabilization, held in Vicksburg, Mississippi, on May 22-23, 1973, a representative of the U.S. Army Engineer District, Walla Walla, described the Jackson Hole Flood Control Project on the Snake River in Wyoming, and requested the advice of the Committee on certain aspects of the project. At its 29th meeting, held in Jackson, Wyoming, on September 18-19, 1973, the Committee inspected and further discussed various aspects of the project. Specific questions that were submitted in writing by the District representative at the May meeting were given, followed in each case by the respective response of the Committee as initially prepared after the May meeting and modified after the September inspection and meeting. To clearly identify the Jackson Hole Flood Control Project, the authorized project description extracted from the reports supplied by the district was briefly summarized. Committee recommendations were presented. (Sims-ISWS) W75-06475

FLOODWAY DETERMINATION USING COM-PUTER PROGRAM HEC-2,

Hydrologic Engineering Center, Davis, Calif. For primary bibliographic entry see Field 7C. W75-06481

PROCEDURES MANUAL FOR DETECTION AND LOCATION OF SURFACE WATER USING ERTS-1 MULTISPECTRAL SCANNER DATA, VOLUME I - SUMMARY.

National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center. For primary bibliographic entry see Field 7C. W75-06484

PREDICTION OF SEEPAGE THROUGH CLAY SOIL LININGS IN REAL ESTATE LAKES, Arizona Water Resources Research Center, Tuc-

Son. G. Sposito

Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 063, \$3.75 in paper copy, \$2.25 in microfiche. Completion Report, 1975. 36 p. 3 fig. 1 tab, 26 ref, append. OWRT A-055-ARIZ (1). 14-31-0001-5003.

Descriptors: *Seepage control, Water conservation, Clays, *Southwest US, Lakes, *Artificial lakes, Soil water, Leakage, *Underseepage, Equations, Water loss, Infiltration, *Reservoir leakage, *Linings, Forecasting. Identifiers: *Clay liners.

The rapid expansion in the development of real estate lakes in the Southwest has produced a somewhat haphazard use of clay soils or clays in attempts to seal these lakes against seepage losses. This situation is further aggravated by the fact that very little basic information exists on the equilibrium and movement of water in a swelling clay soil, which is the type of natural lining material of direct relevance to seepage control. New results are presented in the theory of swelling clay soils, including a description of the equilibrium moisture profile and the steady flow of water in a submerged, saturated, natural clay soil liner. The theory then is applied to develop an equation for the rate of seepage (the rate of lowering of the

Field 4-WATER QUANTITY MANAGEMENT AND CONTROL

Group 4A-Control Of Water On The Surface

water surface) through a swelling liner in a real estate lake of simple trapezoidal configuration. This equation is compared to the standard results for the seepage rate, as calculated on the classical theory of water flow through non-swelling soils, and is applied to estimate the seepage rate from an experimental reservoir studied by Rollins and Dylla (1970). The principal conclusions are: (a) the major effect of swelling in the liner, except for very shallow lakes, is to cancel the contribution of gravity to the seepage rate, (b) the most important factor determining seepage loss is likely to be the soil water tension in the pervious soil surrounding the lake and liner, and (c) the seepage equation can provide a useful estimate of the rate of loss when the important geometric and soil water parameters for the lake, the liner, and the surrounding soil are available. W75-06516

REDESIGNING FLOOD MANAGEMENT - PRO-

JECT AGNES PHASE I, New York State Coll. of Agriculture and Life Sciences. Ithaca. Dept. of Agricultural Economics. For primary bibliographic entry see Field 6F. W75-06520

RESEARCH ON WATER RESOURCES EVALUATION METHODOLOGY, A RIVER BASIN ECONOMIC AND FINANCIAL POST-

Little (Arthur D.), Inc., Cambridge, Mass. For primary bibliographic entry see Field 6B. W75-06524

ANALYSIS OF RELIEF WELLS IN EMBANK-MENTS,

Osmania Univ., Hyderabad (India). Dept. of Civil Engineering. For primary bibliographic entry see Field 4B.

W75-06537

A LIMNOLOGICAL STUDY OF SILVERWOOD LAKE: IMPACT OF WATER TRANSPORT ON WATER QUALITY, California State Polytechnic Univ., Pomona.

For primary bibliographic entry see Field 5A. W75-06538

MARKOV MIXTURE MODELS FOR DROUGHT LENGTHS,

Harvard Univ., Boston, Mass. Graduate School of **Business Administration.** For primary bibliographic entry see Field 2A. W75-06545

BIRTH-DEATH MODELS FOR DIFFERENTIAL

PERSISTENCE, Harvard Unov., Boston, Mass. Graduate School of Business Administration. For primary bibliographic entry see Field 2E. W75-06546

A THEORY OF THE COMBINED MOLE-TILE DRAIN SYSTEM, Utah State Univ., Logan. Dept. of Agricultural

and Irrigation Engineering. For primary bibliographic entry see Field 2F. W75-06547

UNIQUE WATER SUPPLY PROBLEMS IN THE NORTH WEST OF SOUTH AUSTRALIA, South Australian Dept. of Health, Adelaide For primary bibliographic entry see Field 6D. W75-06553

BIOLOGICAL, CHEMICAL AND RELATED ENGINEERING PROBLEMS I STORAGE LAKES OF TASMANIA, IN

Commission. Hydro-Electric (Australia). Civil Engineering Div. H H McFie

Water (Journal of the Australian Water and Wastewater Association) Vol 1, No 4, p 14-17, December 1974, 1 fig. 1 tab. 1 ref.

Descriptors: *Lakes, *Reservoir operation, *Hydroelectric plants, *Biological properties, *Water chemistry, *Australia, Limnology. Stratification, Thermal properties, Chemical properties, Corrosion, Hydraulic structures, Concrete structures, Fish populations, Dams.
Identifiers: Great Lake(Tas), Lake St. Clair(Tas),
Lake Rowallan(Tas), Lake Pedder(Tas), Lake

The Tasmanian Hydro-Electric Commission Australia, has seven man-made lakes with capacities of greater than 124,000,000 cu m, and an additional three under construction. The general features of these lakes, in terms of stratification, aquatic ecology and water chemistry are briefly described. Problems encountered in maintaining three of the existing lakes, and related features of two of those being completed, are discussed in more detail, with particular reference to fish populations and deterioration of structures. (Levick-CSIRO) W75-06556

MODERNIZATION OF NATIONAL WEATHER FORECASTING SERVICE TECHNIQUES, RIVER

National Weather Service, Silver Spring, Md. W. T. Sittner. Water Resources Bulletin, Vol 9, No 4, p 655-659,

August 1973, 7 ref.

criptors: *River forecasting, *River systems, Hydrology, Mathematical models, Computers, Runoff, Precipitation, Simulation analysis, Runoff, Precipitation,
Parametric hydrology, Systems analysis, River
basin development, Technology, *Forecasting.
Identifiers: *National Weather Service, Catchment models, Parameter optimization, Data requirements.

The National Weather Service, which has the responsibility for making and issuing river and flood forecasts throughout the United States, is nearing the conclusion of a five year period of transition from index type catchment modeling to the use of conceptual hydrologic models. The decision to make this technological change was based on an extensive research project in which various catchment models were tested in a wide variety of basins and their strong and weak points ascer-tained. This project is described. Some of the problems involved in the changeover include prac-tical parameter optimization methods, computer requirements for the more complex technology, data requirements, fitting of the catchment model to major river systems, training of personnel, and staffing. (Bell-Cornell)
W75-06562

SYSTEM FOR REGULATION OF COMBINED SEWAGE FLOWS.

Municipality of Metropolitan Seattle, Wash. For primary bibliographic entry see Field 5D. W75-06563

A PROTOTYPE OF THE MODERN SETTLING-RESERVOIR IN ANCIENT MESOPOTAMIA, Illinois Univ., Urbana. World Hertiage Museum.

Water Resources Bulletin, Vol 9, No 3, p 577-582, June 1973. 1 fig. 18 ref.

Descriptors: *Irrigation systems, *Canals, *Reservoirs, *Settling basins, *History, *Deserts, Flood control, Water supply, Agriculture, Weirs,

Outlets, Inlets(Waterways), Water utilization, Identifiers: *Iraq(Ancient Mesopotania), Settling

reservoir. In Iraq, the area once served by an ancient canal system is now abandoned to desert. The Ur III

texts would indicate that the Sumerian irrigation system allowed the raising of good crops of grain, vegetables and fruits in an area now completely barren except for an occasional thorn-bush. The Sumerian term nag-ku5, a key word referring to the ancient Sumerian canal and irrigation systems, is discussed. Ur III material suggests that the nag-ku5 may have served a role similar to that of the modern settling-reservoir. The nag-ku5 was probably a place where silt could settle out of the canal water before it left by the kun (tail) or outlet. Umma texts indicate that the nag-ku5 provided the means for regulation of the rate and amount of water flow to the fields. In addition to being a water flow to the flexis. In addition to being a regulatory device, it was also critical for daily life, serving as a trough of clear water for men and animals. The aim of this study is the hope that knowledge of the past can help this desert bloom once more. (Bell-Cornell) W75-06565

PROCEDURES, Colorado Univ., Boulder. For primary bibliographic entry see Field 5G. W75-06566 RESTORATION

LONG-TERM RECONSTRUCTION OF WATER LEVEL CHANGES FOR LAKE ATHABASCA BY ANALYSIS OF TREE RINGS, Arizona Univ., Tucson. Lab. of Tree-Ring Research.

C. W. Stockton, and H. C. Fritts. Water Resources Bulletin, Vol 9, No 5, p 1006-1027, October 1973. 6 fig, 5 tab, 19 ref.

Descriptors: *Dendrochronology, *Lakes, *Water levels, *Canada, Rivers, Dams, Deltas, Variability, Hydraulics, Hydrology, Sampling, Waterways, Trees, Water resources, Management, Ecology, Channels, Levees, Data collections. Identifiers: *Water level reconstruction, Canonical analysis, *Tree-ring data, White Spruce.

A study of past changes in lake levels demonstrates that dendrochronology can be a useful tool in water resources management. Recent closure of the gates on the W.A.C. Bennett Dam on the Peace River in British Columbia caused a drop in water levels of Lake Athabasca. Since the ecology of the lake and adjacent delta region had depended on the now lessened snow-melt flooding from the Upper Peace River Basin, it became necessary to consider artificially inducing this annual inunda-tion. It was necessary to determine the long-term water level changes affecting the present ecology. Water levels in the channels could be correlated with lake levels. Using canonical analysis and 10-day mean lake levels for three different subperiods in the known 33-year record of lake level changes, along with tree-ring series from appropriately chosen stands of white spruce (reflecting the water chosen stands of white spruce (reflecting the water stages in the channels), reconstructions were made of the long-term record for late May, early July, and late September. Results show May lake levels have been three times as variable in the past as in the period of historical record (1935-1967), July levels twice as variable, and September levels 10% less variable. However, the mean water level for each of the three subspaciods for the long-term each of the three subperiods for the long-term record is very close to the means for the period of istorical record. (Bell-Cornell) W75-06569

WATER QUALITY MANAGEMENT: THE CASE

FOR RIVER BASIN AUTHORITIES, Ohio Univ., Athens. Dept. of Civil Engineering. For primary bibliographic entry see Field 5G. W75-06571

WATER QUANTITY MANAGEMENT AND CONTROL—Field 4

Control Of Water On The Surface—Group 4A

NUMERICAL MODELING OF THERMAL STRATIFICATION IN A RESERVOIR WITH LARGE DISCHARGE-TO-VOLUME RATIO, Tennessee Valley Authority, Muscle Shoals, Ala. Air Quality Branch. For primary bibliographic entry see Field 2H.

PRESERVATION AND ENHANCEMENT OF THE AMERICAN FALLS AT NIAGARA-FINAL REPORT TO THE INTERNATIONAL JOINT COMMISSION.

American Falls International Board, Buffalo, N.Y. For primary bibliographic entry see Field 6G. W75-06574

o

RAIN-A WATER RESOURCE.

Department of the Interior, Washington, D.C. For primary bibliographic entry see Field 3B.

CALIFORNIA SURFACE WATER LAW. I. M. Goldman. Hastings Law Journal, Vol 17, p 826-834, May 1966. 45 ref.

Descriptors: *Judicial decisions, *Natural flow doctrine, "Reasonable use, "California, "Surface waters, Surface runoff, Legal aspects, Land tenure, Water rights, Common law, Repuision(Legal aspects), Riparian rights, Riddance(Legal aspects), Overland flow, Urban runoff, Civil law, Adjacent land owners, State jurisdiction, Runoff.

Identifiers: Comparative law, Water rights(Non-

A seeming confusion exists in the courts of California as to what the California law of surface waters is. This confusion is apparent in two conflicting decisions handed down recently by different state appellate courts. In the case of Keys v. Nomley, it was held that the common law doctrine of reasonable use governed surface water rights in urban areas. In Pagliotti v. Acquistapace, another court ruled that the law of California as to surface waters in urban, as well as rural, areas is the 'civil law' doctrine of natural flow. These two cases are evaluated and other California decisions concerning surface waters are also discussed. It is con-cluded that the civil law doctrine is and has been the law of California, but there is a trend toward adoption of the reasonable use rule. The two doctrines are compared and it is suggested that the reasonable use doctrine is the better rule, particularly for urban areas. (Sperling-Florida)

PRESERVATION OF WETLANDS: THE CASE OF SAN FRANCISCO BAY, Environmental Protection Agency, Washington,

D.C. Office of Water Programs R. A. Luken.

Natural Resources Journal, Vol 14, p 139-152, January 1974.

Descriptors: *Shore protection, *Interfaces, *Wetlands, *Bays, Conservation, Dredging, Dikes, Zoning, Government, Environmental control, Land development, reclamation, Economic justification, Economic impact, Weather patterns, ncome analysis. Identifiers: *Private interest groups, *State policy.

The extensive conversion of wetlands in the San Francisco Bay area has resulted in the creation of the San Francisco Bay Conservation and Develop-ment Commission. The Commission is authorized to regulate areas subject to Bay dredging, diking and filling and to control zoning within a shoreline band one-hundred feet deep from the landward limit of the Bay. Pressure for wetland conversion is attributable to commercial and governmental efforts directed towards economic development. This impetus can be overcome only if such Commissions maintain the support of those parties who are adversely affected by their endeavors. In particular, private property owners are subject to rental loss and communities face decreased tax revenue. Legal devices, acquisition and taxation controls, and transfer payments are all potential institutional devices which are capable of sustaining the support of such concerned interest groups. Measured against effectiveness, equity, and efficiency the legal and taxation techniques best minimize expense and promote effectiveness and equity, while the transfer payments best nullify community proclivity for development. (Gagliardi-Florida) W75-06592

WATER: SUPPLY, DEMAND AND THE LAW, Resources for the Future, Inc., Washington, D.C. For primary bibliographic entry see Field 6D. W75-06594

NEW WATER LAW PROBLEMS AND OLD PUBLIC LAW PRINCIPLES, New Mexico Univ., Albuquerque. For primary bibliographic entry see Field 6E.

W75-06595

PROVIDENCE RIVER AND HARBOR, RHODE ISLAND (FINAL ENVIRONMENTAL IMPACT STATEMENT).

Corps of Engineers, Waltham, Mass. New England Div. For primary bibliographic entry see Field 5G. W75-06615

INTERFERENCE WITH THE FLOW OF SUR-FACE WATER, For primary bibliographic entry see Field 6E. W75-06620

ORGANIZATIONAL PROBLEM-SOLVING, Kansas Water Resources Research Inst., Manhat-

For primary bibliographic entry see Field 6B. W75-06643

ELEMENTS IN A DECISION FRAMEWORK FOR PLANNING THE ALLOCATION OF COASTAL LAND AND WATER RESOURCES WITH ILLUSTRATION FOR A COASTAL

COMMUNITY, Massachusetts Univ., Amherst. Dept. of Agricultural and Food Economics. For primary bibliographic entry see Field 6B. W75-06645

FORECASTING SNOWMELT RUNOFF IN THE

UPPER MIDWEST, Minnesota Univ., Minneapolis. Dept. of Civil and Mineral Engineering.
For primary bibliographic entry see Field 2A.
W75-06648

BACTERIOLOGY OF STREAMS AND THE AS-SOCIATED VEGETATION OF A HIGH MOUN-TAIN WATERSHED.

Wyoming Univ., Laramie. Water Resources Research Inst.

Research Just.

STUDY OF ALTERNATIVE DIVERSIONS. RE-PORT ON THE HYDROLOGICAL STUDIES OF MANITOBA HYDRO SYSTEM.

Underwood, McLellan and Associates Ltd., Winnipeg (Manitoba). For primary W75-06664 ary bibliographic entry see Field 8B.

CHENANGO RIVER, FLOOD PLAIN INFOR-

Army Engineer District, Baltimore, Md. For primary bibliographic entry see Field 2E.

SUSQUEHANA RIVER, FLOOD PLAIN INFOR-

Army Engineer District, Baltimore, Md. For primary bibliographic entry see Field 2E.

SUSQUEHANNA AND CHENANGO RIVERS--FLOOD PLAIN INFORMATION.

Army Engineer District, Baltimore, Md. For primary bibliographic entry see Field 2E. W75-06679

METHOD OF EXCAVATING TO FORM OR EN-LARGE A WATERWAY, L. N. Smith.

U.S. Patent No. 3,867,772, 5 p, 9 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 931, No 4, p 1471, February 25, 1975.

Descriptors: *Patents, *Water resources development, *Dredging, Reclamation, Earth handling equipment, Eutrophication, Lakes.

A method of enlarging an underwater basin or body of water having an earth bank with trees, brush, and roots growing on it, is to move a material collecting dredge element in a generally horizontal path below the water level to collect earth material from the bank. A rotating chipper disc having knife mechanism for reducing the trees, brush and roots to chips and fragments is also moved in a horizontal path at water level. Both the chipped material and earth material are removed by the dredge in slurry form. The object is to provide a method for economically reclaiming atrophied lakes and making new shorelines available at reasonable prices. (Sinha-OEIS)

REMOVAL OF MARINE GROWTHS FROM LAKES, WATERWAYS, AND OTHER BODIES OF WATER.

For primary bibliographic entry see Field 5G. W75-06696

DRAINAGE DENSITY AND EFFECTIVE PRECIPITATION.

Sri Lanka Univ., Peradeniya. Dept. of Geography. C. M. Madduma Bandara.

J Hydrol (Amst). Vol 21, No 2, p 187-190, 1974,

*Precipitation(Atmospheric), Descriptors: *Drainage density, Evaporation, Water loss. Identifiers: Sri-Lanka, *Ceylon.

Recently in a study of the morphometry of dissec-tion in the central hills of Sri Lanka, it was found that the relationship between drainage density and effective precipitation in this area is significantly positive. This result when considered in combination with other findings could be interpreted as an indication that above a certain critical level of effective precipitation (i.e., 80-90) the relationship between drainage density and P/E index turns positive. Such a conclusion is in agreement with the results of recent work by Langbein and Schumm (1958) and Hadley and Schumm (1961), who demonstrated that sediment yield reaches a maximum under grassland conditions and possibly reaches another peak where the impeding effect of vegetation cannot be increased by further increase of precipitation.--Copyright 1974, Biological Abstracts, Inc.
W75-06704

Field 4-WATER QUANTITY MANAGEMENT AND CONTROL

Group 4A-Control Of Water On The Surface

WELLAND CANAL WATER QUALITY CONTROL EXPERIMENTS (PHASE II),

Department of the Environment, Ottawa (Ontario). Wastewater Technology Centre. For primary bibliographic entry see Field 5G. W75-06736

PEAK FLOWS BY THE SLOPE-AREA METHOD,

Department of the Environment, Ottawa (Ontario). Water Resources Branch. For primary bibliographic entry see Field 2E. W75-06745

NEW BRUNSWICK FLOOD, APRIL-MAY 1973. Environmental Protection Service, Halifax (Nova Scotia). Atlantic Region.

Technical Bulletin No. 81, 114 p, 1974. 40 fig, 11 ref. 48 tab.

Descriptors: *Flooding, *Floods, *Snowmelt, *Runoff, *Rainfall, *Forecasting, Flood forecasting, Damages, Flood damage, Control, Flood control, Flood stages, Hydrographs, *Canada. Identifiers: *Snow accumulation, Forecasting techniques.

During the latter part of April and early part of May 1973, extreme flood conditions occurred in most parts of New Brunswick. These conditions were caused by rainfall combined with heavy snowmelt. The most seriously affected part of the province was the flood plain of the Lower Saint John River in the Fredericton area and in the agricultural lands a few miles downstream of Fredericton. Damages in these two areas accounted for about 60 per cent of the total economic cost of the flood. During the 1973 flood, forecasting and emergency measures activities were successful in avoiding more serious personal hardship and greater economic losses. Warning provided through weather and streamflow forecasting permitted some advance planning to react to the emergency while the Emergency Measure Organization proved its worth in directing the disaster activities. In spite of this, the flood caused an estimated \$2.5 million in damage to moveable property. Continuation and improvement of flood forecasting and emergency measures programs are clearly desirable. (Environment Canada)

FLOOD STAGES AND DISCHARGES FOR SMALL STREAMS IN TEXAS, 1972, Geological Survey, Austin, Tex.

E. E. Schroeder. Geological Survey open-file report, 1974. 283 p, 1 fig, 3 tab, 11 ref.

Descriptors: *Floods, *Texas, *Small watersheds, *Stage-discharge relations, *Basic data collections, Peak discharge, Gaging stations, Hydrologic data.

Basic hydrologic data that may be used to define the magnitude and frequency of floods for drainage areas of less than 20 square miles in Texas are compiled. A network of 150 crest-stage partial-record gages was established. These gages are distributed throughout the State to sample all hydrologic areas and flood-frequency regions. Each gages site is equipped with one or more crest-stage gages and a stage-rainfall recorder. Theoretical stage-discharge ratings have been computed for 142 stations utilizing the culvert geometry and slope in a computer program. The stage-discharge relation for the other eight gages, which are located at bridges, can be defined by current-meter measurements or by indirect methods such as slope-area, contracted-opening, slope-conveyance, flow-over-roadway embankment, or other special studies. (Knapp-USGS) W75-06754

A SURVEY OF THE WATER RESOURCES OF ST. CROIX, VIRGIN ISLANDS,

Geological Survey of Puerto Rico, San Juan. D. G. Jordan.

Geological Survey open-file report (Caribbean District), 1973. 131 p, 29 fig, 6 tab, 17 ref.

Descriptors: *Water resources, *Surface waters, *Groundwater, *Virgin Islands, Hydrologic data, Water yield, Water quality, Rainfall-runoff relationships.

Identifiers: *St. Croix(VI).

St. Croix. V. I., consists of two mountainous volcanic rock cores separated by a graben containing clays with minor limestone and conglomerate that is overlain by about 300 feet of marl and limestone. Predominantly fine-grained alluvium mantles much of the limestone and marl area and fills overdeepened south-trending valleys to depths of as much as 100 feet. Rainfall follows an orographic pattern ranging from about 30 inches in eastern St. Croix to 55 inches in the northwestern mountains. Storm runoff from individual storms seldom exceeds 5 percent of the rainfall. The low proportion of storm runoff is attributed to the capability of the soil zone to accept large volumes of water and deficient soil moisture most of the year. The retention of large volumes of rainfall in the soil zone from which it is evaporated and transpired by plants greatly reduces the water available for recharge to the aquifers of the island. Estimates of effective recharge to the aquifers range from less than 0.5 inch in some volcanic and marl rocks to 5 inches annually in more porous limestone and alluvium. Most areas where major groundwater supplies are available, principally in central St. Croix, have already been developed. The Castle Coakley area, with a potential yield of 400,000 gpd, is the only major groundwater area still undeveloped. Advancements in desalination have made brackish groundwater in the Kingshill Marl (estimated at 35 billion recoverable gallons) a potential source of water. (Knapp-USGS)

HANDBOOK FOR A FLOOD PLAIN MANAGE-

MENT STRATEGY,
East-West Gateway Coordinating Council, St.
Louis, Mo.
For primary bibliographic entry see Field 6F.
W75-06764

EVALUATION OF FOUR COMPLETED SMALL WATERSHED PROJECTS: SOUTH CAROLINA, MARYLAND, IDAHO-NEVADA, AND WEST VIRGINIA

Economic Research Service, Washington, D.C. For primary bibliographic entry see Field 4D. W75-06765

FLOOD PLAIN INFORMATION: MILL CREEK, KOOSKOOSKIE AND VICINITY, WALLA WALLA COUNTY, WASHINGTON.

Army Engineer District, Walla Walla, Wash.
Prepared for Walla Walla County, Washington,
May, 1972. 22 p, 6 fig, 3 tab, 13 plates, glossary.

Descriptors: *Flooding, *Floods, *Flood plain, Flood control, Flood protection, Levees, Historic flood, *Washington. Identifiers: *Mill Creek(Wash),

*Kooskooskie(Wash), Intermediate Regional Flood, Standard Project Flood.

Mill Creek slopes at 78 feet per mile and the channel averages 94 feet wide and 4.2 feet deep. The topography is extremely rugged and has been classed as the watershed for Walla Walla's water supply, which limits man's access and activities. The flood plain in the vicinity of Kooskooskie is mainly agricultural with some rural residences. Warm winds and rain cause a large winter runoff during December and January. Spring runoff caused by rainfall and snowmelt occurs in March

and April. A stream gage at Kooskooskie and newspaper files provided data. Mill Creek is subject to short duration flash floods but not to sustained floods. Three of four bridges over the creek obstruct flood flow. A small diversion dam near Kooskooskie has no flood control capacity. A few small privately constructed levees offer little protection against a large flood. The greatest known flood occurred on December 23, 1964 cresting at 19.3 feet, where 16 feet marks the bankfull stage. The most recent flood on January 6, 1969, crested at 18.3 feet. Flood stages for an Intermediate Regional Flood would be 20.9 feet and for a Standard Project Flood would be 24.6 feet. Both supercede the largest known flood and, therefore, are capable of causing great damage and health hazards. Areas that would be flooded are detailed. (Salzman-North Carolina)

FLOOD PLAIN INFORMATION: BLACKSNAKE CREEK, ST. JOSEPH, MISSOURI.

Army Engineer District, Kansas City, Mo. Prepared for the City of St. Joseph, Missouri and the Missouri Water Resources Board, April, 1971. 30 p, 8 fig, 3 tab, 7 plates.

Descriptors: Floods, Flooding, *Flood control, *Flood protection, *Flood plains, *Flood profiles, Farmponds, *Missouri. Identifiers: *Blacksnake Creek(Mo), St. Joseph(Mo).

Blacksnake Creek, a small left bank tributary of the Missouri River, flows through St. Joseph to join the river. The watershed, with a drainage area of 8.6 square miles, has an elongated elliptical shape about 6 miles long and 2 miles wide. Channel dimensions are about 40 feet wide and 10 feet deep with a slope of 43 feet/mile. Lower channel is enclosed in a deteriorating conduit of varying sizes constructed to carry storm water and afford greater utilization of the lower flood plain area. Development in the flood plain averaging 400 feet wide consists of aged warehouses, commercial and industrial structures. Agricultural areas dominate portions of the flood plain north of St. Joseph. Most floods are caused by short duration hunderstorms having high intensity rainfall. Flood damage prevention measures include 8 flood detention structures and 9 farmponds which together control only the headwaters which is about 12% of the drainage area above the conduit. During the largest recorded flood in May, 1962, flood water rose approximately 7 feet in half an hour and remained out of banks for over an hour. An Intermediate Regional Flood (IRF) and Standard Project Flood (SPF) would cause inundation of the flood plain with estimated peak discharges of 6400 cfs and 13,900 cfs with flows out of banks about six hours. Areas and depths of flooding are shown. (Salzman-North Carolina)

FLOOD PLAIN INFORMATION: NACHES RIVER, CITY OF NACHES AND VICINITY, WASHINGTON,

Army Engineer District, Seattle, Wash. Prepared for Yakima County, May, 1972. 24 p, 8 fig, 6 tab, 13 plates.

Descriptors: *Flood plains, *Planning, *Flood plain zoning, *Flood profiles, Flood damage, Obstruction to flow, Historic floods, Flood data, Land use, *Washington.
Identifiers: *Naches River(Wash), Naches(Wash),

Flood plain management, Standard Project Flood, Intermediate Regional Flood.

The narrow flood plain of the Naches River, a major tributary of the Yadkin River, is primarily agricultural with some commercial development. Valley hills are used for orchards, leaving only the lowlands adjacent to the river for future expansion of the city of Naches. Average river slope in the study reach is 30.8 feet/mile. Winter and spring

WATER QUANTITY MANAGEMENT AND CONTROL-Field 4

Control Of Water On The Surface—Group 4A

floods caused by heavy rainfall or snowmelt or a combination generally rise slowly and stay out of banks for long periods. Greatest recorded flood occurred in December, 1933. Due to insufficient data for this flood, the more recent flood of May, 1948 is used for comparison purposes. Peak discharge of the May, 1948 flood was 12,600 cfs with an elevation of 1567.5 feet, mean sea level datum. An Intermediate Regional Flood (IRF) would be 4.5 feet higher and would produce 33,500 cfs. Main channel velocity would average 12 to 15 feet/second and cause severe stream-bank ero-sion. A Standard Project Flood (SPF) would be er 4.5 feet higher with a peak discharge of 83,000 cfs. Levees along both banks at Naches and two irrigation storage reservoirs on upper tributahave beneficial effects in reducing flooding in the flood plain area. The Comprehensive Land Use Plan for this area should be revised to reflect the flood plain and flood hazard information presented. (Diefendorf-North Carolina) W75-06769

FLOOD PLAIN INFORMATION: LITTLE BLUE RIVER, EAST FORK, WHITE OAK BRANCH, JACKSON COUNTY, MISSOURI,

Army Engineer District, Kansas City, Mo. Prepared for the Jackson County Court and the Missouri Water Resources Board, May, 1970. 33 p, 13 fig, 4 tab, 24 plates.

Descriptors: *Floods, *Flooding, *Flood control, *Flood plains, Flood protection, Levees, *Missouri.

Identifiers: *Jackson County(Mo), Little Blue River(Mo), East Fork(Mo), White Oak Branch(Mo)

Little Blue River, originating in north-central Cass County, Missouri, flows northward through Jackson County to join the Missouri River. With its tributaries, East Fork and White Oak Branch, the river drains an area of 270.2 square miles, 90% ich lies in Jackson Conty. Elevations range from 1000 feet, mean sea level (msl) in the head-waters to 700 feet msl at its mouth. The basin (overall length of 33 miles, maximum width of 13 miles) contains numerous impoundments including recreation lakes and private and public ponds. The flood plain lies along the southeastern fringe of Kansas City as well as portions of Independ with many of the developed residential and com-mercial properties unprotected. Much of the land is still in agricultural use. Downstream from East Fork, the river slopes 2.3 feet per mile with a chan-nel width ranging from 30 to 80 feet and banks 18 to 24 feet high. Above East Fork, the stream slopes at 2.8 feet per mile with a channel width of 18 feet and bank height of 10 feet. Manmade enments including 27 bridges obstruct flood flow. Comprehensive flood damage prevention measures include an improved and enlarged channel in conjunction with the construction of the Atherton Levee, located in the lower flood plain. The largest known flood occurred on September 14, 1961 with a peak discharge of 9,460 cfs, cresting at 27.94 feet compared to the flood stage eleva-tion of 18.0 feet. The most recently recorded flood on June 15, 1968 crested at 20.92 feet. An Intermediate Regional Flood and Standard Project Flood would have estimated peak discharges of 27,500 cfs and 52,000 cfs, respectively. Both would cause damages in excess of \$40 million. (Salzman-North Carolina) W75-06770

SPECIAL FLOOD HAZARD INFORMATION: MILL CREEK, UMATILLA COUNTY, OREGON.

Army Engineer District, Walla Walla, Wash. Prepared for Umatilla County Oregon, February 1972. 10 p, 4 fig, 1 tab, 8 plates.

Descriptors: Floods, Flooding, *Flood plains, *Flood control, *Levees, Flood protection, *Washington, *Oregon.

Identifiers: *Mill Creek(Wash), Umatilla County(Wash), Henry Canyon(Ore), Intermediate Regional Flood, Standard Project Flood.

Mill Creek with a study reach of 1.6 miles extends from Oregon-Washington State line upstream to the mouth of Henry Canyon with most of the flood plain devoted to summer homes and cabins. The average stream slope is 84 feet per mile; its channel averages 73 feet in width and 4.4 feet in depth. Flooding on Mill Creek is frequent, occurring 29 times in the past 36 years. Floods on Mill Creek are of short duration and flood stages rise and recede rapidly. Road bridge approach fills for 5 bridges and brush in the channel restrict flood flows. A levee, between sections 102 and 103. reduces high flows somewhat, but it is vulnerable to failure due to construction material, lack of adequate bank protection, and existing channel alignment which directs flow at the levee. The largest known flood occurred on March 31, 1931. An Intermediate Regional Flood would have an estimated discharge of 3000 cfs at the state line, while a Standard Project Flood resulting from severe rainfall plus snowmelt would result in a discharge of 8250 cfs. (Salzman-North Carolina) W75-06771

FLOOD PLAIN INFORMATION: YAKIMA RIVER, CITY OF SELAH AND VICINITY, WASHINGTON.

Army Engineer District, Seattle, Wash. Prepared for Yakima County and City of Selah, June 1973, 26 p, 9 fig, 7 tab, 10 plates.

Descriptors: *Flood plains, *Flood plain zoning, *Land use, Planning, Flood damage, Flood data, Flood profiles, Obstruction to flow, Reservoirs, Dams, Levees, *Washington, Historic floods. Identifiers: *Yakima River(Wash), Selah(Wash), Yakima Valley(Wash), Flood plain management, Standard Project Flood, Intermediate Regional Flood

Hills adjacent to Yakima Valley are used extensively for orchards, leaving the less fertile valley floor relatively undeveloped, and a convenient site for future expansion of Selah. Selah Valley is about 4 miles long and 1 1/2 miles wide; the section of the Yakima River described covers a reach of approximately 8 miles with flood plain primarily agricultural land and irrigated pasture with some commercial, industrial, and residential develop-ment. Highest flood flow recorded was in November 1906 although the December 1973 discharge would have been greater had crests not been materially reduced by operation of upstream reservoirs. Winter floods from rainfall may be expected in November and December. Spring floods are caused primarily by snowmelt. Extensive levees along both banks and floatable materials stored on the flood plain create a constricting effect during floods. As compared to the peak discharge of 41,000 cfs at Umtanum gage in 1906, peak discharge of an Intermediate Regional Flood (IRF) would be 35,000 cfs and of a Standard Project Flood (SPF) 60,000 cfs. Main channel velocity of flow would average 8 to 10 feet/second for an IRF causing severe erosion and transporting large objects. Both types of flood would result in inun-dation of developed land, causing considerable damage. (Diefendorf-North Carolina)

SPECIAL FLOOD HAZARD INFORMATION REPORT: BAYOU SARA, BAYOU SARA CREEK, NORTON CREEK, HELLS SWAMP BRANCH, VICINITY OF SARALAND, ALABAMA.

Army Engineer District, Mobile, Ala. Prepared for City of Saraland, August 1972. 23 p, 10 fig, 6 tab, 8 plates.

Descriptors: *Flood forecasting, *Flood control, *Flood plains, *Flood damage, *Flood profiles, Flood data, Historic floods, Obstruction to flow,

Flash floods, Land use, Planning, *Alabama, Hurricanes, Thunderstorms, Tidal effects.
Identifiers: Bayou Sara(Ala), Bayou Sara Creek(Ala), Norton Creek(Ala), Hells Swamp Branch(Ala), Saraland(Ala), Mobile Bay, U.S. Highway No. 43(Ala), Standard Project Flood, Intermediate Regional Flood, Flood plain manage-

In the vicinity of Saraland in southwest Alabama, numerous residential, industrial, and commercial developments are subject to flooding and have been damaged by past floods. Norton Creek, a tributary of Bayou Sara Creek, traverses the city with 12 bridges creating obstructions to flow. Parts of Norton Creek and Hells Swamp Branch channels are completely clogged by debris. Floods resulting from tropical storms occur mostly during August and September, from frontal type storms during winter, and in summer from thunderstorms. Hurricane tidal surges in Mobile Bay also create critical floods. The largest recorded flood occurred in April 1955 from phenomenal rainfall resulting in flash flooding. Peak discharges at U.S. Highway No. 43 on Bayou Sara Creek for the 1955 flood was 15,000 cfs compared to 14,400 cfs for an Intermediate Regional Flood (IRF) and 20,900 cfs for a Standard Project Flood (SPF). Above Craft Highway approximately 2,900 acres would be flooded by an IRF with 3,850 acres being flooded by an SPF. Both floods would create hazardous conditions. A system of levees, floodwalls, and diversion channel to protect urban development was considered but not recommended as annual cost would have exceeded annual benefit. However, a channel enlargement and clearing project Norton has Creek been completed. (Diefendorf-North Carolina) W75-06773

REMOTE SENSING,

Bureau of Reclamation, Washington, D.C. For primary bibliographic entry see Field 7B. W75-06775

FLOOD PLAIN INFORMATION: SPRING BRANCH, INDEPENDENCE, MISSOURI. Army Engineer District, Kansas City, Mo. Prepared for the City of Independence, Missouri, February 1973. 25 p. 16 fig, 4 tab, 8 plates.

Descriptors: Floods, *Flooding, *Flood control, *Flood plain, *Flood protection, Flood flow, *Flood profiles, *Missouri, Velocity.

Identifiers: *Spring Branch(Mo), Independence(Mo), Intermediate Regional Flood(IRF), Standard Project Flood(SPF).

Spring Branch Basin drains a 10.75 square mile area in northeastern Independence. The channel slopes at an average of 24 feet/mile with a width of 30 feet. Flood plain has a sewage treatment plant plus agricultural land interspersed with residential and industrial areas. No gaging station exists. Newspaper files, historical documents and records provided information. Flood producing storms occur from April through October causing floods of high peaks, high velocities, short duration and relatively small run-off. Channel debris and continued encroachment on flood plain impede flood flow. Although no planned flood damage program for Spring Branch, Independence planning a recreational dam and reservoir on one of the stream's small tributaries, but it will have little effect on flood flow. According to newspaper accounts the greatest flooding occurred on September 14, 1961 as a result of intense rainfall in a 24 hour period and created problems of overflow near the sewer treatment plant. Plant floods have been of minor magnitude on Spring Branch. However, based on analysis of flow records of nearby streams, an Intermediate Regional Flood (IRF) or Standard Project Flood (SPF) would inundate the flood plain with possible velocities of flow as much as 16.9 feet/second and 20.3 feet/second respectively in the channel. An SPF could rise at

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the rate of 3 feet/hour and be above bankfull for approximately 8 hours. Release of raw sewage caused by inability of sewage treatment plant to handle high discharges would create a health hazard for the entire community. (Salzman-North Carolina) W75-06779

KEY LAND USE ISSUES FACING EPA. Harbridge House, Inc., Boston, Mass. For primary bibliographic entry see Field 5G. W75-06780

FLOOD HAZARD ANALYSES: FOX RUN, STARK AND WAYNE COUNTIES, OHIO. Soil Conservation Service, Columbus, Ohio For primary bibliographic entry see Field 2E. W75-06781

URBAN SYSTEMS ENGINEERING DEMON-STRATION PROGRAM FOR HINDS, MADIS-ON, RANKIN COUNTIES, MISSISSIPPI, VOLUME I: AREA-WIDE WATER SYSTEMS. Clark, Dietz and Associates, Inc., Jackson, Miss For primary bibliographic entry see Field 5D. W75-06783

URBAN SYSTEMS ENGINEERING DEMON-STRATION PROGRAM FOR HINDS, MADIS-ON, RANKIN COUNTIES, MISSISSIPPI, VOLUME IV. AREA-WIDE STORM DRAINAGE AND FLOOD PLAIN MANAGEMENT STUDIES. Clark, Dietz and Associates, Inc., Jackson, Miss. For primary bibliographic entry see Field 5D. W75-06785

COMPREHENSIVE LAND USE PLANNING-ITS DEVELOPMENT AND POTENTIAL IMPACT ON COASTAL ZONE MANAGEMENT, Rhode Island Univ., Kingston. Marine Affairs Program.

Marine Affairs Journal, Number 1, p 9-32, December 1973.

Descriptors: *Planning, *Coasts, *Land use, *Land management, *Land resources, *Land management, *Land resources, *Legislation, *Rhode Island, Zoning, Natural resources, Local governments, State governments, Federal governments.

Identifiers: "Coastal zone management, "Coastal Resource Management Council, Office of Re-gional Planning, "Land use policy, Jackson Land Use Bill, Muskie Land Use Bill.

Due to inadequate management practices of local, state and regional governments, the federal government has become involved in comprehensive land use policies. Developed from the Jackson, Muskie and Nixon Administration Bills. federal policy supports state participation in areas of regional and/or statewide impact. Local govern-ments are also authorized to develop, implement and regulate land use plans. On the national level the Office of Regional Planning within the Depart-ment of Interior is already involved with coastal zone activities with increased responsibility for coastal areas of environmental concern likely in the future. Rhode Island's coastal zone manage ment stems from a statewide land use plan which considers the factors of urban sprawl, population growth, inadequate protection of water supplies, inadequate protection for estuarine and marine fisheries and inadequate provision for future recreation uses. Existing state laws exercise land use control through zoning, land acquisition, and other regulations. Adoption of a comprehensive system whereby local governments must conform system whereby local governments must conform to local imposed zoning is urged. The Coastal Resources Management Council should be or-ganized with the State Department of Natural Resources with competent experts in coastal zone affairs. (Salzman-North Carolina)

SPECIAL FLOOD HAZARD INFORMATION REPORT: GALLAGHER CREEK, MERIDIAN, LAUDERDALE COUNTY, MISSISSIPPI. Army Engineer District, Mobile, Ala.

Prepared for Mississippi Research and Development Center, June 1972. 13 p, 2 tab, 11 plates.

Descriptors: *Floods, *Flooding, *Flood plain, *Flood control, *Flood profiles, Flood protection, Flash floods, *Mississippi, Flood damages, Velocity. *Gallagher Creek(Miss), Meridi-Identifiers:

Regional Flood(IRF), Flood(GPF). an(Miss), Lauderdale County(Miss), Intermediate Greater

Gallagher Creek, having a slope of 21 feet/mile, flows south through Meridian for 7 miles before emptying into Sowashee Creek. Its narrow drainage basin (average width of one mile) is about 75% urbanized with much residential property in the flood plain. Since it is ungaged, data were limited in compiling historical information as well as forecasting future flood information. Floods in winter and spring are caused by frontal type storms lasting 2 to 4 days and covering large areas. Summer thunderstorms with a high intensity over small areas may cause flash flooding. To reduce flood crests, Meridian has replaced some of smaller culverts with larger bridges and cleared the channel of trees and undergrowth in some places. No flood regulation measures exist. One of the largest floods occurred on July 30, 1971 with an estimated peak discharge of 4500 cubic feet per second and caused damages of about \$1.5 million.

An Intermediate Regional Flood (IRF) and a
Greater Probable Flood (GPF) which has an average frequency of occurrence once in 500 years would be of equal or greater magnitude than previous floods. An IRF could result in inundation of 500 acres of residential and commercial sections of Meridian including private and public utilities with about 600 acres damaged by a GPF. Main channel velocities can be expected of 4 to 11 feet/second for an IRF, slightly higher during a GPF. (Salzman-North Carolina) W75-06792

PLAIN INFORMATION: FLOOD PENASQUITOS DRAINAGE AREA, SAN DIEGO COUNTY, CALIFORNIA.

Army Engineer District, Los Angeles, Calif. Prepared for San Diego County and the City of San Diego, May 1967. 26 p, 6 fig, 31 plates, ap-

Descriptors: *Flood, *Flood plain, *Flood profile, *Flood damage, Flood water, *California. Identifiers: San Diego County(Calif), Soledad Canyon(Calif), Carmel Valley(Calif), *Los Penasquitos Creek(Calif), Intermediate Regional Flood, Standard Project Flood.

Los Penasquitos area, mostly in an undeveloped part of San Diego County, is about 15 miles north of the City of San Diego. This study includes parts of the flood plains of Soledad Canyon, Carmel Valley, Los Penasquitos Creek, Poway Creek, Rattlesnake Creek, and Pomerado Valley. A spe-cial problem area is Poway Valley, 3.5 miles long with a total drainage area of about 4.4 miles, where project-housing developments have been built with some homes and roads in the flood plain, and some of the flood-control channels constructed are inadequate for large floods. Steady growth continues in manufacturing, government, and tourism, the major industries, with rapid increases in population and in urban and industrial development. Since the land is semiarid with streamflow generally occurring only during storms, flood hazards are often not apparent. Areas along downstream reaches of streams are most vulnera ble to flood damage. Channels are poorly defined and adequate to accommodate only minor flows. Nature and extent of flood problems for San Diego County, Los Penasquitos area and each sub-area are given. Storms lasting several days occurring from December through March cause most floods. Plates show the extent of flooding in the various areas for a Standard Project Flood, an Intermediate Regional Flood (100-year flood), and a lesser flood (50-year). The overflow area of the Intermediate Regional Flood has been selected by local interests to be used in flood plain planning and regulation. (Park-North Carolina) W75-06793

4B. Groundwater Management

SUBSURFACE WASTE DISPOSAL BY INJEC-TION IN HAWAII: A CONCEPTUAL FORMU-LATION AND PHYSICAL MODELING PLAN. Hawaii Univ., Honolulu. Water Resources Research Center For primary bibliographic entry see Field 5B. W75-06351

THE IMPORTANCE OF SALINITY IN URBAN WATER MANAGEMENT,

Culp, Wesner, Culp Clean Water Consultants, Corona Del Mar, Calif. For primary bibliographic entry see Field 3C. W75-06372

HYDROGEOLOGY AND WATER QUALITY MANAGEMENT,

Moody and Associates, Inc., Harrisburg, Pa. Environmental Services Div. For primary bibliographic entry see Field 5G. W75-06400

AND OF **ENVIRONMENTAL ECONOMIC** EVALUATION NUCLEAR DISPOSAL BY UNDERGROUND IN SITU MELTING, California Univ., Livermore. Lawrence Liver-

more Lab. For primary bibliographic entry see Field 5B. W75-06413

HYDROLOGIC CHARACTERISTICS RESPONSE OF FRACTURED TILL AND CLAY CONFINING A SHALLOW AQUIFER, Waterloo Univ. (Ontario). Dept. of Earth For primary bibliographic entry see Field 2F. W75-06434

EFFECT OF APPLICATION RATE, INITIAL SOIL WETNESS, AND REDISTRIBUTION TIME ON SALT DISPLACEMENT BY WATER, Punjab Agricultural Univ., Ludhiana (India). Dept. of Soils.

For primary bibliographic entry see Field 2G. W75-06437

PROTECTION OF RESOURCES IN COASTAL ZONES THROUGH PLANNED DEVELOPMENT, Florida Univ., Gainesville. Dept. of Civil and

Coastal Engineering. B. A. Christensen.

Water Resources Bulletin, Vol 9, No 6, p 1201-1209, December 1973. 8 fig, 7 ref.

Descriptors: *Planning, *Land management, **Groundwater, **Water resources, Saline water intrusion, Comprehensive planning, Future, Planning(Projected), Alternative planning, Conservation, Interfaces, Coasts, Preservation,

A study was described from a purely groundwater resources standpoint, dealing with the establish-ment of methods for identification of areas which are suitable development and of areas where complete preservation or controlled and limited

development should be encouraged. A graphic methodology was proposed. Required data input is available from most federal and state agencies involved with water resources inventories or development. The procedure was said to be usable by the nontechnically trained user. (Jess-ISWS)

A SURROGATE-PARAMETER APPROACH TO MODELING GROUNDWATER BASINS, Colorado State Univ., Fort Collins. Dept. of Civil Engineering. For primary bibliographic entry see Field 2F. W75-06449

PICKLING LIQUORS, STRIP MINES, AND GROUND-WATER POLLUTION, Ohio State Univ., Columbus. Dept. of Geology and Mineralogy.
For primary bibliographic entry see Field 5B. W75-06450

NATURAL SOIL NITRATE: THE CAUSE OF THE NITRATE CONTAMINATION OF GROUND WATER IN RUNNELS COUNTY, TEXAS Texas Univ., Austin. Bureau of Economic Geology. For primary bibliographic entry see Field 5B. W75-06452

THE EFFECTS OF DIMINISHED GROUND-WATER SUPPLIES ON SELECTED NEW HAMPSHIRE INDUSTRIES: AN ECONOMIC AND LEGAL EVALUATION, New Hampshire Univ., Durham. Water Resource Research Center.

R. H. Forste.

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Available from the National Technical Information Service, Springfield, Virginia 22161, as PB-241 127, \$4.25 in paper copy, \$2.25 in microfiche. Bulletin No 5, June 1973, 71 p, 15 fig, 27 tab, 26 ref. OWRT A-028-NH(3), 14-31-0001-3529.

*Water water utilization, "Groundwater, "Reasonable use, Competing uses, Legal aspects, Water rights, Resource allocation, Economics, Water law, "New Hampshire, Water supply, Institutional constraints, Withdrawal, Water allocation(Policy), Industries, Water sources.

Increasing withdrawals of groundwater for industrial and residential uses in New Hampshire present allocation problems involving legal and economic equity. Legal issues have been based on the rule of reasonable use. To deal with groundwater allocation the economic damages/losses resulting from diminished groundwater should be considered and estimated. The New Hampshire courts haven't had these estimates, or a methodology for determining them. The objectives of this study were to (1) estimate the costs in-curred by industrial groundwater users if supply constraints are imposed; (2) outline a methodological framework to guide decisions on resource allo-cations; (3) assess the impact on selected industrial groundwater users in the short-run and project long-run adjustments under supply contraints. Four firms were selected for analysis. Cost structure of the firms was related to their industrial processes. The groundwater law and equity were examined. Several implications may be drawn from the findings: (1) research on the availability of groundwater supplies is necessary; (2) owner ship of groundwater rests in the public and should be utilized accordingly; (3) the premise of societal ownership implies regulation and management of the resource by the State; (4) regulatory commis-sions and courts should have the economic implications of alternatives available when faced with a groundwater dispute. The partial budgeting simulations developed provide an example of one technique that would be feasible, useful and expeditious in this context. (Wakefield-New Hampshire)

PRELIMINARY STUDIES ON QUALITY OF UN-DERGROUND WATERS ON GROWTH AND YIELD OF COCONUT (COCOS NUCIFERA), Regional Research Station, Mudigere (India). For primary bibliographic entry see Field 3C. W75-06466

IMPLEMENTATION PACKAGE FOR A DRAINAGE BLANKET IN HIGHWAY PAVE-MENT SYSTEMS, Federal Highway Administration, Washington, D.C., Implementation Div. For primary bibliographic entry see Field 4C. W75-06470

GROUNDWATER SUPPLIES IN PUBLIC MASON COUNTY,

Illinois State Water Survey, Urbana D. M. Woller, and J. P. Gibb.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 131, \$3.25 in paper copy, \$2.25 in microfiche. Bulletin 60-12, 1975, 9 p.

Descriptors: *Water supply, *Illinois. *Groundwater resources, *Well data, Uncon-solidated aquifers, Gravels, Sand aquifers, Groundwater, Groundwater availability, Hydrology, Hydrogeology, Water resources, Water quali-Water wells, Municipal water, Water yield, Water properties, Hardness(Water), Chemical properties, Shallow wells, Deep wells, Geology. Mason County(III), Identifiers: minerals, Water bearing formations.

All available information is reported on production wells used for public groundwater supplies in Mason County, Illinois. The definition of public water supply as contained in the Environmental Protection Act of 1970 was used to determine those water systems and wells to be included. Sand and gravel deposits in the unconsolidated materials above bedrock are tapped as the sources for municipal water supplies. There are 11 municipal production and standby wells tapping these aquifers to depths ranging from 78 to 222 ft. Re-ported yields range from 60 to 1000 gpm depending primarily upon the type of well constructed and the permeability, thickness, and areal extent of the sand and gravel unit tapped by each well. The iron content of these wells ranges from 0.0 to 4.6 mg/1, and the hardness from 140 to 341 mg/1. A description for each production well includes the aquifer tapped, date drilled, depth, driller, legal location, elevation in feet above mean sea level, log, con-struction features, yield, pumping equipment, and chemical analyses. (Humphreys-ISWS)

PUBLIC GROUNDWATER SUPPLIES IN STARK COUNTY, Illinois State Water Survey, Urbana.

D. M. Woller, and J. P. Gibb.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 132, \$3.25 in paper copy, \$2.25 in microfiche. Bulletin 60-11, 1975. 10 p, 1 fig.

Descriptors: *Water supply, *Illinois, *Groundwater resources, *Well data, Aquifers, *Groundwater resources, Hell Groundwater, Bedrock, Sandstones, Dolomite, Groundwater, Groundwater availability, Hydrology, Groundwater availability, Hydrology, Hydrogeology, Water resources, Water quality, Water wells, Municipal water, Water yield, Water properties, Hardness(Water), Chemical proper-ties, Deep wells, Geology, Sulfates, Chlorides. Identifiers: *Stark County(III), Dissolved minerals, Water bearing formations. All available information is reported on production wells used for public groundwater supplies in Stark County, Illinois. The definition of public water supply as contained in the Environmental Protection Act of 1970 was used to determine those water systems and wells to be included. Unconsolidated sand and gravel deposits generally do not provide adequate water for municipal use and have not been tapped by any municipalities. Un-derlying bedrock units are tapped for water supplies. Seven wells, ranging in depth from 758 to 2082 ft, have reported yields from 52 to 320 gpm. Analyses of water they produce indicate the iron content ranges from 0.0 to 2.4 mg/1, hardness from 55 to 324 mg/1, sulfates from 60 to 350 mg/1, chlorides from 200 to 600 mg/1, and total dissolved minerals from 900 to 1900 mg/1. A description for each well includes the aquifer or aquifers tapped, date drilled, depth, driller, legal location, elevation tures, yield, pumping equipment, and chemical analyses. (Humphreys-ISWS) W75-06528

GROUNDWATER SUPPLIES PUBLIC PERRY COUNTY,

Illinois State Water Survey, Urbana. D. M. Woller.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 133, \$3.25 in paper copy, \$2.25 in microfiche. Bulletin 60-13, 1975. 5 p.

Descriptors: *Water supply, *Illinois, *Groundwater resources, *Well data, Ground-Groundwater resources, "Well data, Groundwater, Groundwater availability, Hydrology, Hydrogeology, Water resources, Water quality, Water wells, Municipal water, Water yield, Water properties, Hardness(Water), Chemical properties, Deep wells, Aquifers, Geology, Bedrock, Dissolved

Identifiers: *Perry County(Ill), minerals, Water bearing formations.

All available information is reported on production wells used for public water supplies in Perry County, Illinois. The definition of public water supply as contained in the Environmental Protection Act of 1970 was used to determine those water systems and wells to be included. Consolidated bedrock and wells to be included. Consolidated bedrock aquifers are tapped as the primary source of municipal water supply. Two wells tap Pennsylvanian sandstones at depths of 550 and 575 ft. Their reported yields are 33 and 130 gpm. Past and recent analyses of water they produce indicate that the iron content ranges from 0.0 to 0.7 mg/l and the hardness ranges from 166 to 186 mg/l. Pennsyl-vanian sandstone and underlying Mississippian limestone are tapped by two wells 550 and 557 ft deep. Their reported yields are 40 and 90 gpm. Their iron content ranges from 0.4 to 1.4 mg/1 and their hardness ranges from 183 to 220 mg/1. Water from the shallower Pennsylvanian rocks including thin coals is fairly highly mineralized in most of Perry County. For this reason, these rocks have been cased from the well and the deeper sandstone ocen cased from the well and the deeper sandstone and limestone units containing less mineralized water are tapped for municipal supplies. A description for each production well includes the aquifer tapped, date drilled, depth, driller, legal location, elevation in feet above mean sea level, log, construction features, yield, pumping equipment, and chemical analyses. (Humphreys-ISWS) W75-06529

ANALYSIS OF RELIEF WELLS IN EMBANK-

MENTS, Osmania Univ., Hyderabad (India). Dept. of Civil Engineering.

Indian Geotechnical Journal, Vol 4, No 3, p 271-277, July 1974. 3 fig, 2 tab, 5 ref.

Descriptors: *Groundwater, *Seepage, *Embankments, *Pressure head, *Dewatering, Unsteady flow, Levees, Alluvial aquifers, Mathe-

Field 4—WATER QUANTITY MANAGEMENT AND CONTROL

Group 4B-Groundwater Management

matical studies, Theis equation, Well spacing, High pressure, Analytical techniques, Equations, Confined water, Drawdown, Hydrostatic pressure, Surface-groundwater relationships, Earth dams, Sand boils.

Relief wells.

Seepage under earth dams and levees through pervious foundations is a serious problem. Relief wells are particularly effective to control the seepage and hydrostatic pressures. Available formulas and design methods pertain to steady state seepage; however, this does not truly represent the actual response during early stages of pumping. Analytical and graphical results were given to assess the parameters involved in the analysis of transient seepage flow for pressure relief problems. (Prickett-ISWS)

WATER TABLE POSITION AS AFFECTED BY

SOIL AIR PRESSURE, Agricultural Research Service, Reno, Nev. D. R. Linden, and R. M. Dixon. Water Resources Research, Vol 11, No 1, p 139-143, February 1975. 6 fig. 8 ref.

Descriptors: *Drainage, *Irrigation, *Border irrigation, *Water table, *Recharge, Groundwater, Piezometers, Atmospheric pressure, Groundwater recharge, Infiltration, On-site investigations. Identifiers: *Soil air pressure, Hydraulic head.

Air pressure in the unsaturated soil and hydraulic heads beneath a shallow water table were measured during border irrigations. Air pressures rose during the irrigation, thereby increasing the hydraulic heads. The increased hydraulic heads were not uniformly distributed under the border strip but varied in the cross-slope and with-slope directions and thus caused groundwater redistribution. Cross-slope and with-slope variations in air pressures also caused variations in infiltration and groundwater recharge. (Schicth-ISWS)

DRAINAGE OF GROUNDWATER RESTING ON A SLOPING BED WITH UNIFORM RAINFALL, Agricultural Research Council, Cambridge (England). Unit of Soil Physics. G. D. Towner.

Water Resources Research, Vol 11, No 1, p 144-147, February 1975. 3 fig, 1 tab, 5 ref.

Descriptors: *Drainage, *Groundwater, *Water table aquifers, *Rainfall, *Ditches, Steady flow, Hydraulic conductivity, Watersheds(Divides), Equations, Water table, Height, Slopes, Surfacegroundwater relationships. Identifiers: *Sloping aquifer.

The differential equation derived by Childs for groundwater flow over a sloping bed, the streamlines being assumed to be parallel to the slope, is integrated for the case of ditches and uniform rainfall. Experssions are obtained for the maximum vertical water table height, the location of this maximum and of the watershed, and the water table shape. Calculated water table heights are in much better agreement with previously published experimental data than those calculated from an earlier theory based on the assumption that streamlines are horizontal. Thus Childs' revised assumption is confirmed. An approximate solution for the form of the water table under small rainfall rates is also derived. (Visocky-ISWS)

UNIQUE WATER SUPPLY PROBLEMS IN THE NORTH WEST OF SOUTH AUSTRALIA, South Australian Dept. of Health, Adelaide. For primary bibliographic entry see Field 6D. W75-06553

ADMINISTRATION OF GROUND WATER AS BOTH A RENEWABLE AND NONRENEWABLE RESOURCE,

Idaho Bureau of Mines and Geology, Moscow. D. R. Ralston.

Water Resources Bulletin, Vol 9, No 5, p 908-917, October 1973. 4 fig, 6 ref.

Descriptors: *Groundwater, *Management, *Water law, *Administration, *Idaho, Water rights, Hydraulics, Annual, Recharge, Discharge(Water), Aquifers, Water levels, Water storage, Wells, Pumping, Rates, Stock water, Flow, *Water resources, River basins. Identifiers: *Raft River Basin(Idaho).

Groundwater is intended to be administered in many western states as a flow or renewable resource. In Idaho, this administration is based on the appropriation doctrine of water rights. Two generalizations may be made concerning ground-water. First, water artificially discharged from an aquifer system must deplete the total resource by that amount; water consumptively pumped from a well must be derived from either increased recharge, decreased discharge, or a decrease of water in storage. Second, the annual rate of recharge to a groundwater system is often only a small percentage of the total resource in storage. Groundwater may be divided into flow and stock portions. In those basins where the second generalization is true, most groundwater may be generalization is true, most groundwater may be classified as stock. However, only the flow por-tion of groundwater may be developed if utiliza-tion of the resource is to be enjoyed over an in-finite period. Data from the Raft River Basin in Idaho indicate that the flow and stock charac-teristic of groundwater are time dependent. The teristics of groundwater are time dependent. The resource exhibits the characteristics of both a renewable and nonrenewable resource. As a result, present administrative techniques do not provide for effective management of the resource. (Bell-Cornell) W75-06570

GROUNDWATER POLLUTION: CASE LAW THEORIES FOR RELIEF,

Missouri Univ., Columbia. For primary bibliographic entry see Field 5B. W75-06589

PROGRAM SOPH - SIMULATION OF TIME-VARIANT PIEZOMETRIC SURFACE IN A CONFINED AQUIFER SUBJECT TO PUMPING, Department of the Environment, Ottawa (Ontario). Water Resources Branch.

A. Vanden Berg. Inland Waters Directorate, 1974. 56 p, 10 fig, 2 ref, 9 tab, append.

Descriptors: *Aquifers, *Piezometry, *Computer programs, *Pump testing, *Groundwater, Simulation analysis, Aquifer characteristics, Wells, Operations research, Synthetic hydrology, Dynamic programming, Model studies, Computers, Theoretical analysis.

The necessary documentation is provided for the application of computer program SOPH (Simulation of Piezometric Head). SOPH employs the alternating direction implicit procedure (ADIP) to calculate the time-variant piezometric-head distribution in a two-dimensional aquifer which is subjected to pumping and/or recharging. The preparation of the input card deck is described in detail and further clarified by working out an example. A listing of the FORTRAN program is given in the appendix. (Environment Canada) W75-06737

SUBSURFACE DISPOSAL OF WASTE IN CANADA - II, DISPOSAL-FORMATION AND INJECTION-WELL HYDRAULICS,

Department of the Environment, Ottaw (Ontario). Water Resources Branch. For primary bibliographic entry see Field 5E. W75-06750

SUBSURFACE DISPOSAL OF WASTE IN CANADA - III - REGIONAL EVALUATION OF POTENTIAL FOR UNDERGROUND DISPOSAL OF INDUSTRIAL LIQUID WASTES, Water Resources Branch.

Water Resources Branch. For primary bibliographic entry see Field 5E. W75-06751

GROUND-WATER LEVELS AND WELL RECORDS FOR CURRENT OBSERVATION WELLS IN IDAHO, 1922-73, PARTS A, B, AND

C, Geological Survey, Boise, Idaho.

H. G. Sisco.
Geological Survey Basic-Data Release (3 volumes), September 1974. Total pages 1234 (vol 1-309; vol 2-495; and vol 3-430).

Descriptors: *Basic data collections, *Idaho, *Hydrologic data, Water levels, *Water wells, Withdrawal, *Observation wells.

The groundwater-level data presented were collected to provide the basic data needed by agencies and individuals interested in developing, managing, and administering the groundwater resources in Idaho. The development of Idaho's groundwater resources has expanded at a very rapid rate in recent years. A large part of the agricultural water supply, as well as most municipal, industrial, and domestic supplies, is derived from wells. Use of groundwater has been accompanied by a decline of local and, in some cases, regional groundwater levels. The operation of this statewide observation-well network also provides data that can be used to: (1) indicate changes in the amount of groundwater in storage and thereby suggest the water-supply outlook for the future; (2) identify areas in which groundwater levels are at or are approaching land surface, or are declining toward current or foreseeable limits of economic lift; (3) forecast changes in the base flow of streams; and (4) provide long-term records for use in water-resource investigations. (Knapp-USGS)

GROUND-WATER DATA FOR MICHIGAN, Geological Survey, Lansing, Mich. For primary bibliographic entry see Field 7C. W75-06756

A SURVEY OF THE WATER RESOURCES OF ST. CROIX, VIRGIN ISLANDS, Geological Survey of Puerto Rico, San Juan. For primary bibliographic entry see Field 4A. W75-06757

KALAMAZOO COUNTY, MICHIGAN, WATER QUALITY STUDY. Jones and Henry, Toledo, Ohio. For primary bibliographic entry see Field 5G.

EDWARDS AQUIFER, A STUDY OF EDWARDS RECHARGE ZONE REQUIREMENTS, AACOG WATER QUALITY PLANNING, PHASE 5, Alamo Area Council of Governments, San Antonio, Tex. W. F. Wilson. 1970. 25 p. 12 fig.

Descriptors: "Spring waters, "Aquifer management, "Groundwater, Water yield, "Saline water intrusion, Water sources, Water storage, Aquifer characteristics, Groundwater reservoirs, Groundwater recharge, Natural recharge, Safe yield, Water supply, Water pollution, Waste water treatment, Sewage effluents, "Texas, "Recharge. Identifiers: "San Antonio(Tex), "Edwards Aquifer(Tex).

WATER QUANTITY MANAGEMENT AND CONTROL-Field 4

Watershed Protection—Group 4D

Both the quantity and quality of water discharged from the Edwards Aquifer around San Antonio and the Alamo Area Council of Governments (AACOG) region, supplying 90% of its water. Since 1950 the annual accumulated discharge has since 1950 the accumulated recharge 78% of the time. If pumpage from the Edwards continues to increase as it has this deficit will increase, reducing pressure in the fresh water zone and allowing salt water intrusion to the area's wells. Alternative sources of water must be developed or consumption decreased: at the present growth rate in the re-gion the projected water needs by 2000 exceed the combined resources of the Edwards Aquifer, Applewhite Lake, Cibolo Lake, even if the Aquifer were pumped so much that the natural springs in were pumped so much that the natural springs in the area stopped flowing. This is perhaps a clear case of population growth limited by water supply. A related problem is water quality. The 28,000 square miles of attractive rolling topography where the Edwards outcrops to the north of San Antonio is under increasing pressures of urbaniza-tion. A regional water treatment system is needed on the Edwards recharge area to prevent disas-trous contamination of this fresh water source from a dispersed arrangement of small treatment plants. (Herr-North Carolina) W75-06761

ANALYSIS OF ELECTRICAL RESISTIVITY MEASUREMENTS OF SHALLOW DEPOSITS, Iowa State Univ., Ames.

D. W. Tarman

MSc thesis, 1967. 96 p, 22 fig, 1 tab, 26 ref, ap-

Descriptors: *Electrical well-logging, *Resistivity, Geophysics, Borehole geophysics, Shallow wells, Data processing, Documentation, *Iowa. Identifiers: Gish-Rooney method.

The widespread occurrence of glacial drift in the region of central Iowa requires that geologic data be obtained in ways other than from bedrock exposures. Methods available are borehole investigations, correlation between isolated outcrops and geophysical methods. Of the geophysical methods the electrical resistivity method is the fastest and least expensive, potentially. A resistivity survey was conducted over a pre-established grid on a till covered area and over a series of cross sections in a small alluvium-filled valley. The resistivity data were analyzed using several methods including the Gish-Rooney method, the Werner method, the Moore method, the Hummel method, the Tagg method, Roman's method and the Mooney-Wetzel method. The results were compared to values ob tained on the geologic control which consisted of actual cores. The Gish-Rooney method gave actual cores. results within 10 percent of the control depth approximately 75 per cent of the control depth approximately 75 per cent of the time. The other methods are qualitatively analyzed and a set of suggested procedures for well log surveys is presented. A detailed description of the measuring instruments is included. Recommendations include determination of the instruments' sensitivity from a well logged hole, determination of the elec-trical drift on the machine through the laboratory, determination of the soil profile and water table effects. (Bradbeer-NWWA) W75-06808

ANALYSIS OF PUMPING WELL NEAR A STREAM, Arizona Univ., Tucson.

MSc thesis, 1967. 103 p, 17 fig, 13 tab, 23 ref.

Descriptors: *Aquifer testing, *Methodology, *Testing procedures, Drawdown, Irrigation, Irrigation design, Saline water intrusion.
Identifiers: Indus River, *Pakistan(Indus River), Waterlogging.

When pumping of a well begins, the tubewell ob-tains most of its water from the immediate vicini-

ty, but as the cone of influence expands, it receives a part of its water from the nearby stream until the entire amount of water from the stream is drawn. This time will depend on the aquifer characteristics, the tubewell discharge, the distance between the well and the stream, and the infiltration regimen of the stream. The test data were collected from an aquifer test on the Sangla Hill Scheme Tubewell Number 2 in Pakistan. had a depth of 280 feet with a 121 foot screen of 10 inches in diameter. Fifty observation wells were used and their stratigraphic information is provided. Six methods of analysis were used including, (1) the Theis Modified Method by Rorboughs, the Theis Modified Method by Stallman, (3) the Inflection Point Method by Hantush, (4) assump tion that the leaky aquifer was in steady state condition which allows estimation of the coefficient of transmissibility, (5) the percentage contribution of the stream was found by comparison of the coeffi-cient of storage obtained when the stream was dry and full respectively, and (6) the Image Theory by Glover and Balmer. These methods were com-pared. The image method and the inflection point method were easy and accurate compared to the Theis Modified Curves. Yet no single method is recommended as this will depend on the field conditions encountered. (Bradbeer-NWWA)

THE HYDRO-MECHANICS OF THE GROUND WATER SYSTEM IN THE SOUTHERN PORTION OF THE KAIBOB PLATEAU, ARIZONA,

Arizona Univ., Tucson. For primary bibliographic entry see Field 2F. W75-06810

GROUND WATER POLLUTION FROM SUB-VI SURFACE EXCAVATIONS PART DISPOSAL WELLS.

Environmental Protection Agency, Washington, D.C.

For primary bibliographic entry see Field 5D. W75-06812

GROUND WATER POLLUTION FROM SUB-SURFACE EXCAVATIONS, PART VII, PITS AND LAGOONS.

mental Protection Agency, Washington, DC

For primary bibliographic entry see Field 5D. W75-06813

THE SORPTION OF FLUORIDE ION WITH SPECIAL REFERENCE TO FLUORIDE REMOVAL FROM POTABLE WATERS, North Dakota Univ., Grand Forks.

For primary bibliographic entry see Field 5F. W75-06815

HYDROSTRATIGRAPHIC UNITS OF THE SUR-FICIAL DEPOSITS OF EAST-CENTRAL IL-LINOIS.

Illinois Univ., Urbana. For primary bibliographic entry see Field 2F. W75-06817

4C. Effects On Water Of Man's Non-Water Activities

IMPLEMENTATION PACKAGE FOR A DRAINAGE BLANKET IN HIGHWAY PAVE-MENT SYSTEMS,

Federal Highway Administration, Washington, D.C., Implementation Div.

Available from the National Technical Informa-

vion Service, Springfield, Va 22161, as PB-236 395, \$3.75 in paper copy, \$2.25 in microfiche. Report 72-1, May 1972. 25 p, 3 fig, 7 ref, 1 append.

Descriptors: *Highways, *Subsurface drainage, *Hydrogeology, *Soil mechanics, *Subsurface drains, Hydraulics, Soil compaction, Soil filters, Soil investigations, Soil strength, Soil water, Soils, Groundwater, Seepage, Paving, Design. Identifiers: *Drainage blanket, *Subgrade design.

This user package presents guidelines for the use of a two-layer drainage blanket to handle groundwater seepage from under highway pavements. Positive removal of the Water is considered essential in order to minimize the problems of subgrade softening and weakening of pavement structures. A supplemental or companion report closely coordinated with this package provides additional in-formation on guidelines for design of the two-layer system. Title of the report is 'Development of Guidelines for the Design of Subsurface Drainage Systems for Highway Pavement Structural Sections.' It was prepared for the Federal Highway Administration by Cedergren/KOA, a Joint Venture Consulting Firm of Sacramento and Long Beach, California. (Terstriep-ISWS) W75-06470

EFFECTS OF URBANIZATION ON CATCHMENT RESPONSE,
Puerto Rico Univ., Mayaquez. Dept. of Civil En-

incering. For primary bibliographic entry see Field 2E. W75-06534

MISSISSIPPI COASTAL ZONE MANAGEMENT APPLICATION 1974.

Mississippi Marine Resources Council, Long Beach. For primary bibliographic entry see Field 6E.

CALIFORNIA SURFACE WATER LAW, For primary bibliographic entry see Field 4A. W75-06591

IMPACT OF HUMAN ACTIVITIES ON THE QUALITY OF GROUNDWATER AND SURFACE WATER IN THE CAPE COD AREA.

Massachusetts Univ., Amherst. Water Resources Research Center For primary bibliographic entry see Field 5B.

EDWARDS AQUIFER, A STUDY OF EDWARDS RECHARGE ZONE REQUIREMENTS, AACOG WATER QUALITY PLANNING, PHASE 5, Alamo Area Council of Governments, San An-

tonio, Tex. For primary bibliographic entry see Field 4B. W75-06761

4D. Watershed Protection

INTERNATIONAL HYDROLOGICAL DECADE REPRESENTATIVE AND EXPERIMENTAL BASINS IN THE UNITED STATES: CATALOG OF AVAILABLE DATA AND RESULTS, 1965-

National Committee for the Internal Hydrological Decade, Washington, D.C. For primary bibliographic entry see Field 2A. for the International

PRESERVATION AND ENHANCEMENT OF THE AMERICAN FALLS AT NIAGARA-FINAL REPORT TO THE INTERNATIONAL JOINT COMMISSION.

American Falls International Board, Buffalo, N.Y. For primary bibliographic entry see Field 6G.

Field 4-WATER QUANTITY MANAGEMENT AND CONTROL

Group 4D—Watershed Protection

MAN'S ACTIVITIES IN WATERSHED AREAS-A NEED FOR PLANNING, L. P. Wilson.

Environmental Law, Vol 4, p 229-250, Winter

Descriptors: *Lumbering, *Natural resources, *Watershed management, *Recreation, *Oregon, Land management, Water quality control, Planning, Multiple-purpose projects, Environmen tal effects, Environmental sanitation, Legal aspects, Water quality, Water pollution, Soils, Forest management, Federal government, Watersheds(Basins), Watersheds(Divides).

The increasing demand for timber resources and recreation areas has caused federal forest managers to consider previously overlooked areas for development. Especially in the western states municipal watersheds have offered promising pos-sibilities. The use of the watershed and other previously unused areas allows for the dilution of overall forest impacts resulting in a minimization of localized environmental damage. Watershed areas where water and soil are the principal resources differ from forest areas where timber and recreation are the primary resources. Despite a lack of research into multiple-uses of watersheds, exploitation of these areas has already begun. The current legal action to halt logging within the Bull Run Forest Reserve is illustrative of the controversy that can arise when the multiple use of a previously single use watershed area commences without a complete environmental impact report by the agency. The outcome of this case will hopefully decide critical planning is-sues, and provide minimum standards valuable to both the Forest Service and to communities having municipal watersheds. The elements that should be contained within any watershed planning standard are discussed. (Sperling-Florida)

CROSS CREEK WATERSHED PROJECT, WASHINGTON COUNTY, PENNSYLVANIA (FINAL ENVIRONMENTAL IMPACT STATE-

Soil Conservation Service, Washington, D.C. For primary bibliographic entry see Field 8A.

DECOMPOSITION OF FOUR SPECIES OF LEAF MATERIAL IN THREE REPLICATE STREAMS WITH DIFFERENT NITRATE INPUT, Oregon State Univ., Corvallis. Dept. of Fisheries

and Wildlife.

For primary bibliographic entry see Field 5B. W75-06649

EVALUATION OF FOUR COMPLETED SMALL WATERSHED PROJECTS: SOUTH CAROLINA, MARYLAND, IDAHO-NEVADA, AND WEST

Economic Research Service, Washington, D.C. J. D. Sutton.

Agricultural Economic Report No 271, November, 1974. 54 p. 5 fig. 33 tab, 15 ref.

Descriptors: Watershed Protection and Flood Prevention Act of 1954, *Watershed management, *Watersheds(Basins), *South Carolina, *Idaho, "Watershed Mario), "South Carolina, "Idaho,
"Water Virginia, "Maryland, Water control,
"Planning, Economic impact, Economic prediction, Flood control, Drainage effects, Drainage grams, *Small watershed

Identifiers: Cedar Creek(Idaho), Twin Falls County(Idaho), Peck's Run(West Virginia), Upshur County(West Virginia), Coonfoot Branch(Maryland), Worcester County(Maryland), Big Creek(South Carolina), Saluda River(South

The purpose was to determine the efficacy of Soil Conservation planning procedures used in four

small (watershed of 250,000 acres of less) projects initiated under the Watershed Protection and flood Prevention Act of 1954 (P.L. 83-566). The evaluation compared qualitative appraisals of interviewees (residents and officials), perceived costs and benefits to average annual values estimated in the work plan of the projects. Generally, the desired physical manipulation of the resources-flood decrease, increased supply for irrigation, municipal use, and recreation--was achieved, but projected economic effects such as crop yields weren't always generated. In the Big ek Watershed Project, 13,279 acres, in rural Piedmont South Carolina, water supply increased and flooding decreased but flood plain usage was lower than expected. The Coonfoot Branch lower than expected. The Coonfoot Branch Watershed Project, 3,752 acres in rural Worcester County, Maryland, improved drainage, reduced flood damage, and produced improved crop yields. The Cedar Creek Watershed Project, 5,300 acres, in Twin Falls County, Idaho, produced actual costs less than planned, decreased crop yield, damages, provided additional acreage, and increased community income. In the Peck's Run Watershed Project, 8,210 acres, in Upshur and Barbour Counties, West Virginia, Flood damage reduction was as planned, land was freed for use, costs were higher than expected for installation and lower for maintenance, and different land usages and lower yields than expected were produced. (Park-North Carolina) W75-06765

ATE-STAGE PUBLIC MEETING STUDY OF THE NEW JERSEY COASTAL INLETS AND BEACHES FROM BARNEGAT INLET TO LONGPORT,

Army Engineer District, Philadelphia, Pa. Transcript of proceedings held March 19, 1974, at Stockton State College, Pomona, New Jersey, March, 1974. 55 p, 2 append.

Descriptors: Coasts, *Coastal engineering, Erosion, *Erosion control, *Beach erosion, Beaches, Navigation, Storms, Jetties, Dune, Dune sands, Groins, Shore protection, Shores, *New Jersey. Identifiers: *Barnegat Inlet(New Jersey), Long Beach Island(New Jersey), Brigantine Island(New Jersey), Absecon Island(New Jersey), Long-port(New Jersey).

The public hearing was held to assess opinion on proposals to remedy navigation, beach erosion proposals to remedy havigation, beach erosion control, and storm protection problems of the area from Barnegat Inlet to Longport. Solutions included rebuilding key jetties, dredging channels, removing material deposits, construction of groins and berms, raising the beach level, and additional and ocerns, raising the beach level, and additions smaller erosion control projects in various locations. Major Rogge of Brigantine questioned the siphon effect of the littoral drift project and the funding share figures (26.3 million Federal, 24 million local). Mr. Thompson, Surf City Councilman, was concerned with storm protection capabilities and dune protection. Mr. Moore, Supervisor of the Office of Shore Protection, endorsed the project. Mr Barrasso, City Engineer of Atlantic City, discussed the erosion control project, beach restoration, and installation of a submerged breakwater. Other issues included the impact of the projects on private beach ownership, storm warning and protection, dune preservation, and the place ment of a breakwater for a proposed offshore nuclear plant. (Park-North Carolina) W75-06766

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

SENSITIVITY OF VERTEBRATE EMBRYOS TO HEAVY METALS AS A CRITERION OF

WATER QUALITY - PHASE II BIOASSAY PROCEDURES USING DEVELOPMENTAL STAGES AS TEST ORGANISMS, Kentucky Water Resources Inst., Lexington. W. J. Birge, J. J. Just, A. G. Westerman, J. A. Black, and O. W. Roberts.

Available from the National Technical Informa Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 978, \$3.75 in paper copy, \$2.25 in microfiche. Research Report No 84, March 1975. 36 p, 5 fig, 3 tab, 98 ref. OWRT B-039-KY(1). 14-31-0001-4088.

Descriptors: *Bioassay, *Bioindicators, *Heavy metals, *Water quality, *Pollutant identification, *Embryonic growth stage, *Toxicity, Trace elements, Monitoring, Analytical techniques, Cultures, Water pollution effects. Identifiers: *Vertebrate embryos.

Chick, amphibian and fish embryos were evaluated as bioassay and bioindicator organisms. Test procedures were developed by which embryonic es may be used (1) in bioassay systems to evaluate the toxicity of particular metallic or metal-containing trace contaminants, and (2) as bioindicators to monitor the quality of natural water resources. A bioassay technique was devised in which metallic toxicants were administered chick embryos by 'needle tract' injection into the yolk sac. This provided more uniform distribution of test metals throughout the yolk mass than can be obtained by conventional yolk sac injection methods, and gave more sensitivity and uniformity of test results. Metals such as arsenic, cadmium, mercury, lead and zinc are easily detectable at a level of 1 ppb. An in vitro culture technique was developed by which embryos of aquatic ver-tebrates may be 'maintained' for bioassay and bioindicator purposes. Five test species were identified, suitable synthetic culture water was formulated, and culture monitoring procedures were determined. Most toxic metals (e.g., mercury) may be detected at 1 ppb or less with the use of more sensitive embryonic species (e.g., trout). Early cleavage stages of the leopard frog (Rana pipiens) proved more sensitive to cadmium than older embryos, similar to results obtained in Phase I with mercury treatment of trout and frog embryos. (See also W74-03206) (Grieves-Kentucky) W75-06352

THE REMOTE SENSING OF SUSPENDED SEDIMENT CONCENTRATIONS OF SMALL

IMPOUNDMENTS,
Agricultural Research Service, Chickasha, Okla.
Southern Great Plains Watershed Research Center.

For primary bibliographic entry see Field 7B.

AUTOMATED ANALYSIS FOR CYANIDE, Technicon Industrial Systems, Tarrytown, N.Y. A. Conetta, J. Jansen, and J. Salpeter. Pollution Engineering, Vol 7, No 1, p 36-37, January 1975. 3 fig. 1 tab.

Descriptors: *Pollutant identification, *Water analysis, *Automation, *Organic compounds, *Instrumentation, *Analytical techniques, Chemical analysis, Evaluation, Colorimetry, Chemistry, Color reactions, Laboratory tests, Water properties, Nitrogen compounds, Testing procedures, Specifications

Specifications.

Identifiers: *Cyanide, Ultraviolet digestor, Frac-

An automated procedure for the determination of cyanide in water was described. The metal cyanide complexes are broken down with ultraviolet radiation. Continuous distillation is by flash steam. The performance specifications of the system with aqueous standards are: range = 10 to 500 micro-grams/liter, analysis rate = 30 samples/hour, detection limit = 10 micrograms/liter, replication at 300 micrograms/liter = + or -0.27%. (Henley-W75-06403

OF DIFFUSION OF RADIOACTIVE FLUID THROUGH SOIL SURROUNDING A LARGE POWER-REACTOR STATION AFTER A CORE MELTDOWN ACCIDENT.

California Univ., Livermore. Lawrence Livermore Lab. For primary bibliographic entry see Field 5B.

W75-06407

AIR SAMPLING FOR IODINE-125,

Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs. R. M. Holford.

Available from the National Technical Informa-Avanator from the National Technical mormation Service, Springfield, Va 22161 as Rept. No. AECL-4598, \$4.00 in paper copy, \$2.25 in microfiche. Report No. AECL-4598, February 1974. 14 p, 4 fig, 3 tab, 6 ref, 3 append.

Descriptors: *Pollutant identification. *Radioisotopes, *Monitoring, *Iodine, Absorption, Filters, Sampling, Radioactivity, Analytical techniques, Coals, Instrumentation, Measurement.

Identifiers: Charcoal.

In monitoring for air-borne I125, self absorption in the filter on which iodine is collected is a problem because of the low energy of the emitted radiation. Therefore recommended techniques for air sampling at the production facility and the processing laboratory require the use of charcoal-containing filters made of low Z materials. Provided self absorption is not excessive, absolute disintegration rates for I125 can be calculated directly from pulse-height spectra by a method using the coincidence properties of the radiation. (Houser-ORNL)

CESIUM-137 FALLOUT IN RED DESERT BASIN OF WYOMING, USA, Dow Chemical Co., Golden, Colo. Rocky Flats

Div.

D. E. Michels.

Available from the National Technical Information Service, Springfield, Va 22161 as Rept. RFP-2164, \$4.00 in paper copy, \$2.25 in microfiche. Report No. RFP-2164, July 1974, 10 p. 2 fig. 1 tab.

Descriptors: *Radioisotopes, *Radioactivity, *Fallout, *Cesium, *Wyoming, Winds, Snow, Distribution, Soil contamination, Basins, Correlation analysis, Precipitation(Atmospheric), Topography, Research and development, Vegetation, Public health.

Identifiers: *Red Desert basin(Wvo).

High variability characterizes fallout cesium-137 in the Red Desert Basin of Wyoming. Correlations between fallout levels and factors of climate. topography, and vegetation suggest that bare soil more readily captures fallout from wind than does sagebrush; that wet fallout processes are of little significance in this arid place; that association between cesium-137 and snow is weak, hence drifting of snow is not a significant factor in the distribution of fallout; and that impingement of fallout particles directly on soils by wind action may be the dominant mechanism of fallout deposition in the Basin. Analysis was not conclusive when the data were sorted according to a single parameter, either mean annual precipitation or topography or vegetation. However, significant differences between average values and smaller values for standard deviations result when sorting is done according to two parameters, topography and vegetation. Highest levels of cesium-137 were found on barren ridges which, in the Basin, are exposed to persistent synoptic winds. (Houser-ORNL) W75-06409

ENVIRONMENTAL RADIOACTIVITY AT THE NATIONAL NUCLEAR RESEARCH CENTRE, PELINDABA.

Atomic Energy Board, Pelindaba, Pretoria (South Africa). Isotopes and Radiation Div. D. Van As, and C. M. Vleggaar.

Available from the National Technical Information Service, Springfield, Va 22161 as Rept. No. PEL-229, \$4.00 in paper copy, \$2.25 in microfiche. Report No. PEL-229, November 1973. 20 p, 16 tab. 11 ref. append.

Descriptors: *Monitoring, *Surveys, *Radioactivity, *Effluents, *Nuclear wastes, Path Descriptors: of pollutants, Rivers, Radioisotopes, Strontium, Iodine, Public health, Fish, Water, Nuclear explosions, Testing, Fallout. *Gamma radiation, *Critical path, Identifiers:

*Critical radionuclide, Crocodile River.

A revised environmental survey program, introduced during 1970 with the emphasis on monitoring of the critical paths of exposure of the general public, was continued in 1972. Results of determinations of both gross radioactivity and individual nuclides in samples of fish and water (which are critical materials for liquid effluent releases) from the Hartbeespoort Dam and from the Crocodile River are given and discussed. Results of gamma-spectrometric, I 131 and Sr 90 analyses of milk, the critical material for releases to the atmosphere, are presented. Results are given of regular investigations of the composition of effluent releases. These investigations are performed in order to be able to detect other possible critical nuclides. Levels of deposited and airborne activity from nuclear bomb tests are reported. r-ORNL) W75-06410

AIRBORNE GAMMA RADIATION SURVEYS FOR SNOW WATER-EQUIVALENT RESEARCH-PROGRESS REPORT 1973, FOR EG and G, Inc., Las Vegas, Nev. Las Vegas Div. A. E. Fritzsche, and Z. G. Burson. Available from NTIS, Springfield, Va 22161 as

Rept. No. EGG-1183-1623, \$5.45 in paper copy, \$2.25 in microfiche. Report No. EGG-1183-1623, December 1973. 52 p, 22 fig, 8 tab, 6 ref.

Descriptors: Surveys, *Radioactivity, Hydrology, *Snow cover, *Melt water, *Water equivalent, *Air pollution, Aircraft, Remote sensing, Data collections, Great Lakes, Minnesota, Research and development, Technology, Altitude, Meteorology, Soil contamination, Aerial sensing, *Lake Ontario.

The areal average of water equivalent of snow cover was measured by airborne surveys of natural terrestrial gamma radiation for 28 survey lines in the Lake Ontario Basin as a part of the International Field Year for the Great Lakes. Measure ments over selected calibration lines compared well with ground-based data. Errors (plus or minus 0.9 to 1.3 cm) from airborne measurements in the results represent uncertainties in soil moisture effects, sampling statistics and airborne radioactivity contributions. Examination of methods to ac-count for airborne randon daughter contributions concentrated on dual-detector systems in which one detector preferentially 'looked' up. Such systems can be used to separate the airborne radioactivity, but the accuracy of the resulting ground component is limited to about plus or minus 4%. A 4% error in the gamma data produces a 0.7 cm error in the water equivalent. Since at least half of the weight allotment must be dedicated to the shield and additional detectors, and because of the difficulty of obtaining precise es of all constants, an unshielded detector system is recommended at this time for airborne surveys of the water equivalent of snow cover. (Houser-ORNL)

WATER EQUIVALENT OF SNOW DATA FROM AIRBORNE GAMMA RADIATION SURVEYS INTERNATIONAL FIELD YEAR FOR THE

GREAT LAKES, EG and G, Inc., Las Vegas, Nev. Las Vegas Div. Z. G. Burson, and A. E. Fritzsche.

Available from NTIS, Springfield, Va 22161 as Rept. No. EGG-1183-1622, \$5.45 in paper copy, \$2.25 in microfiche. Report No. EGG-1183-1622, December 1973. 59 p, 3 fig, 9 tab, 6 ref, 6 append.

Descriptors: *Surveys, Aircraft, *Radioactivity, *Snow cover, *Water equivalent, *Remote sensing, *Lake Ontario, New York, Great Lake Region, Measurement, Gamma rays, Data collecons, Research and development, Aerial sensing.

Areal determinations of the water equivalent of snow in the Lake Ontario drainage basin in New York State were made from an airborne platform as part of the International Field Year for the Great Lakes (IFYGL) program. About 350 line miles representing the area surrounding Rochester and Syracuse, New York, were surveyed during the fall and winter of 1973. The attenuation by the snow cover of the natural gamma radiation from the soil served as the measurement technique. This method requires surveys both before and after snow covers the ground in order to observe the attenuation of the gamma intensity. Separate measurements of the total photon flux and two specific energy components comprise three water equivalent determinations for each survey line. Results of the airborne areal water equivalent determinations are listed. (Houser-ORNL) W75-06412

TRANSURANICS AT PACIFIC ATOLLS I. CON-CENTRATIONS IN THE WATERS AT ENEWETAK AND BIKINI, California Univ., Livermore. Lawrence Liver-

more Lab.

V. E. Noshkin, K. M. Wong, R. J. Eagle, and C. Gatrousis.

Available from NTIS, Springfield, Va 22161 as Rept. No. UCRL-51612, \$4.00 in paper copy, \$2.25 in microfiche. Report No. UCRL-51612, June 1974. 33 p, 15 fig, 11 tab, 12 ref.

Descriptors: *Radioisotopes, *Radioactivity, *Nuclear explosions, Testing, *Pacific Ocean, *Lagoons, *Atolls, Monitoring, Measurement, Assessment, Hazards analysis, Human population, Water pollution, Public health.

Identifiers: Pacific Atolls, Enewetak, Bikini,

Concentrations and distributions of Pu 239, 240 and other transuranic radionuclides in the lagoon waters of Enewetak and Bikini Atolls are described. The data are derived from a series of described. The data are derived from a series of samples collected during the period October-December 1972. The samples are being radiochemically processed and analyzed for specific radionuclides; the available results for Sr90, Cs137, Np237, Pu238, 239, 240, 241 and Ap241 in precific water samples are presented. Am241 in specific water samples are presented and discussed. (Houser-ORNL) W75-06414

BIOLOGICAL DOSE AND RADIOLOGICAL ACTIVITY FROM NUCLEAR REACTOR OR NUCLEAR WEAPON FISSION PRODUCTS, Oak Ridge National Lab., Tenn.

R. O. Chester.

Available from NTIS, Springfield, Va 22161 as Rept. No. ORNL-4996, \$5.45 in paper copy, \$2.25 in microfiche. Report No. ORNL-4996, December 1974. 92 p, 9 fig, 4 append.

Descriptors: *Nuclear powerplants, *Reactors, *Radioactivity, *Nuclear explosions, *Computer programs, *Model studies, Dispersion, Fallout, Biology, Human population, Radioisotopes, Bioassay, Pollutant identification, Food chains. Identifiers: Yields, Dose calculations.

Group 5A-Identification Of Pollutants

The use of a computer code, YIELDS is described. It performs rapid, accurate calculation of dose and activity from the fission products in a nuclear reactor core or from a nuclear weapon. For example, if a dispersal model is assumed, calculations can be made of contaminated area, dose from inhaled or ingested fission products to each from inflated or ingested residue pour of a biological system, or dose from external fission products, from a dispersed reactor core, or nuclear weapon fallout. Individual beta and gamma ray energies for each isotope are included, permitting detailed calculation of biological dose or other functions of these energies vs time. The calculation method facilitates the handling of complicated radiological decay chains coupled with multisection biological systems. The option of sorting the output by isotopes or chemical species is available. (Houser-ORNL)

HEALTH AND SAFETY LABORATORY FAL-LOUT PROGRAM QUARTERLY SUMMARY REPORT, MARCH 1, 1974 THROUGH JUNE 1,

Health and Safety Lab. (AEC), New York.

E. P. Hardy, Jr.

Available from NTIS, Springfield, Va 22161 as Rept. No. HASL-284, \$13.60 in paper copy, \$2.25 in microfiche. Report No. HASL-284, July 1974. 249 p, 19 fig, 23 tab, 95 ref.

Descriptors: *Monitoring, *Fallout, *Data collections, *Radioactivity, Nuclear explosions, *Soil contamination, *Water pollution, *Air pollution, Diets, Precipitation(Atmospheric), Environment, Milk, Air, Domestic water, Radioisotopes, Strontium, Carbon, Bibliography, Nuclear power plants, Effluents. Identifiers: Weapons testing, Deposition.

Current data are presented from the Health and Safety Laboratory Program, the Swedish National Defense Research Institute, the Air Dynamics Laboratory of NOAA and the Radiological and Environmental Research Division of Argonne National Laboratory. Interpretive reports and notes are presented on radioactivity from nuclear tests in air and precipitation in Sweden; strontium 90 in diet during 1973; surface deposition in the United States; carbon 14 measurements in the strato-sphere during 1971-73; and environmental radia-tion measurements in the vicinity of a boiling water reactor. A bibliography of recent publica-tions related to radionuclide studies is also presented. (See W75-06421 thru W75-06427) (Houser-ORNL) W75-06420

RADIOACTIVITY FROM NUCLEAR WEAPONS IN AIR AND PRECIPITATION IN SWEDEN FROM MID-YEAR 1968 TO MID-YEAR 1972. Research Inst. of National Defence, Stockholm (Sweden)

B. Bernstrom In: Report No. HASL-284, p I-2-33, July 1974. 8 fig, 6 tab, 11 ref.

*Radioactivity, *I *Measurement, Nuclear explosions, *Air pollution,
*Precipitation(Atmospheric), Fallout, Water polhution, Cesium, Barium, Monitorir Radioisotopes, Sampling, Analysis, Pacii Ocean, Data collections, Underground, Testing. Identifiers: *Sweden, China, USSR. Pacific

The concentrations of various fission products in ground level air and precipitation from mid-year 1968 to mid-year 1972 are reported. Since 1963 the cesium-137 concentration in surface air decreases each year to 1967. After a small increase in 1968 the air concentration of cesium-137 remains on the same level to 1971 and decreases during 1972 to the lowest level reported since the measurements started. Short-lived barium-140 was detected in ground level air after the Chinese explosions in December 1968, November 1971, January 1972, and March 1972. After the Chinese tests in September 1969 and October 1970 the concentrati of barium-140 was below the detection level. (See also W75-06420) (Houser-ORNL) W75-06421

STRONTIUM-90 IN THE DIET. RESULTS THROUGH 1973, Health and Safety Lab. (AEC), New York.

B. G. Bennett.

In: Report No. HASL-284, p I-34 - I-48, July 1974. 3 fig, 4 tab, 5 ref.

Descriptors: *Diets, *Strontium, *Surveys, *Census, *Data collections, Data processing, Statistical methods, Food chains, Soil contamina-tion, Path of pollutants, Fallout, New York, Identifiers: *New York City, *San Francisco(Calif).

Estimates of Sr 90 intake via the total diet in New York City and San Francisco have been made since 1960 from quarterly food samplings and average consumption statistics. The dietary intakes of Sr 90 have been decreased from the maximum levels attained during 1963-64, but the declines have become more gradual in recent years due to the continuing small amounts of Sr 90 deposition and the little-changing cumulative deposit of Sr 90 in soil. The annual intake in 1973 averaged 9.7 pCi/day in New York and 3.2 pCi/day in San Francisco, slight decreases from the previous year. (See also W75-06420) (Houser-ORNL) W75-06422

SURFACE DEPOSITION IN THE UNITED

STATES, National Oceanographic and Atmospheric Administration, Silver Spring, Md. Air Resources Labs.

A. J. Miller, R. J. List, and J. D. Mahlman In: Report No. HASL-284, p I-49 - I-63, July 1974. 4 fig, 10 ref.

Descriptors: *Fallout, *Strontium, *Tritium, "United States, "Geographical regions, Regions, Great Plains, Southwest US, Ion exchange, Tracking techniques, Tracers, Radioactive tracers, Model studies, Ion transport, *Utah. Identifiers: Surface deposition, Salt Lake City.

Comparison is made of the surface deposition patterns over the United States as depicted by observations of Strontium 90 in soil, tritium rainout and Strontium 90 in pot and ion-exchange collectors versus the results generated by the general circula-tion tracer model from the Geophysical Fluid Dynamics Laboratory. The following three ob-served data sets exhibit certain common charac-Plains states, (2) A general maximum in the Great Plains states, (2) A general minimum in the Southwest, and (3) A relatively high value, in our an absolute maximum, in the Salt Lake City area. The results of the general circulation tracer model ulations present a reasonable 'first depiction' of the details of surface deposition and are very encouraging as an indicator of the transport of such conservative trace substances. (See also W75-06420) (Houser-ORNL) W75-06423

MEASUREMENTS CARBON-14 MEASUREMENTS IN THE STRATOSPHERE FROM A BALLOON-BORNE **MOLECULAR SIEVE SAMPLER (1971-1973),** Argonne National Lab., III.
R. E. Sowl, J. Gray, Jr., T. E. Ashenfelter, and K.

In: Report No. HASL-284, p I-64 - I-76, July 1974. 1 tab, 7 ref.

Descriptors: *Carbon, *Measurement, *Air pollu-tion, *Pollutant identification, *Fallout, At-mospheric pollution, Path of pollutants, Public health, Nuclear explosions, Sampling, Analysis,

Laboratory equipment, Analytical techniques, Ap-

paratus. Identifiers: Weapons testing, *Molecular sieve

The U.S. Government has conducted an extensive atmospheric program of whole air collection in the troposphere and stratosphere since 1953. These atmospheric samples were analyzed for C14 collected in the form of CO2. Excess C14 (C14 due to nuclear testing) data have been derived and the results made available (Hagemann, et al., 1965; ESSA, 1966, 1967, 1969; NOAA, 1971). Beginning in mid-1970, molecular sieve samples designed to replace the whole air samplers were flown opera-tionally on the USAEC balloon flights in the northern and southern hemispheres. The results from mid-1970 to mid-1971 have been reported (Telegadas et al., 1972). This report contains the Carbon 14 measurements from the balloon-borne molecular sieve sampler since mid-1971. A complete description of the molecular sieve sampler is given by Ashenfelter et al., (1972). (See also W75-06420) (Houser-ORNL)

ENVIRONMENTAL RADIATION MEASURE-MENTS IN THE VICINITY OF A BOILING WATER REACTOR: HASL DATA SUMMARY, Health and Safety Lab. (AEC), New York.

G. de P. Burke. In: Report No. HASL-284, p I-77 - I-88, July 1974.

Descriptors: *Monitoring, *Nuclear power plants, *Effluents, *Measurement, Environment, Model studies, Gases, Data collections, Publications, Analysis, Xenon, Krypton, Sampling, Fallout. Identifiers: *Plume exposure, *Noble gases.

Environmental radiation measurements made over a three-year period in the vicinity of a boiling water power reactor. Contributions to total radiation exposures resulting from the gaseous effluents are calculated from a plume exposure model and compared with values determined from ionization chamber and TLD measurements. In almost all cases, exposures attributable to the plant are less than 10 mR/year. Gas sample analyses are also presented. (See also W75-06420) (Houser-ORNL) W75-06425

PROJECT AIRSTREAM. Health and Safety Lab. (AEC), New York. P. W. Krey, L. E. Toonkel, and M. Schonberg. In: Report No. HASL-284, p II-7 - II-139, July 1974. 5 fig. 14 tab. 52 ref.

Descriptors: *Atmosphere, *Monitoring, Measurement, *Air pollution, *Fallout, Aircraft, *Radioisotopes, Sampling, *Radiochemical analysis, Data collections, Altitude, Analysis, Strontium, Cesium, Cerium, Filters, Equipment, Quality control, Polonium, Lead, Standards, Beryllium,

Project Airstream is the Health and Safety Laboratory's study of radioactivity in the lower stratosphere employing the RB-57F aircraft as a sampling platform. This project is a continuation of the Defense Atomic Support Agency's Project Stardust except that Airstream's sampling missions are limited to only one per season. Radiochemical data are presented from the missions flown in January, September and November 1973 and in January 1974. (See also W75-06420) (Houser-ORNL) (Houser-ORNL) W75-06426

CESIUM-137 IN VARIOUS CHICAGO FOODS (COLLECTION MONTH APRIL 1974),

Argonne National Lab., Ill. J.O. Karttunen. In: Report No. HASL-284, p III-2 - III-5, July 1974. 2 tab, 5 ref.

Identification Of Pollutants—Group 5A

Descriptors: *Diets, *Food chains, *Cesium, *Potassium, *Measurement, Fruit crops, Vegetable crops, Milk, Fish, Analysis, Assay, Assessment, Fallout, Path of pollutants, Cities, *Illinois. Identifiers: *Chicago(Ill), Infant diets, Adult diets.

Since April 1961, the 137Cs and potassium content of the Chicago portion of Tri-City Diet Sampling Program has been determined in bulk food samoles by gamma ray spectrometry using a 4 in x 4 in NaI (T1) crystal. Each variety of food (all fresh vegetables, all fresh fruits, etc.) is composited before measurement, and each sample is counted 400-1000 minutes. From these measurements composite daily and yearly food intakes are obtained. The results for the April 1974 semi-annual are tabulated. (See also W75-06420) (Houser-ORNL) W75-06427

AMINES IN CALIFO WATERS: UTILIZATION CALIFORNIA PRIMARY COASTAL

PHYTOPLANKTON,
California Univ., Irvine. Dept. of Developmental and Cell Biology. B. B. North

Limnology and Oceanography, Vol 20, No 1, p 20-27, January 1975. 3 fig, 2 tab, 27 ref. NSF Grant GA 33904X.

Descriptors: *Pollutant identification, *Amino acids, Organic compounds, *Phytoplankton, Analytical techniques, *Primary productivity, Proteins, Ammonia, Nitrogen compounds, Proteins, Ammonia, Nitrogen com Nitrogen, Evaluation, Instrumentation, plants, Aquatic plants, Fluorescence, *California, Sea water, Coasts, Organic matter, Ecosystems,

Identifiers: *Fluorescamine, *Fluorometric mea-surement, *Newport Bay(Calif), Catalina Chan-

A new reagent, fluorescamine, provides a simple, rapid fluorometric measurement of primary amino compounds in seawater. The reagent detects as little as 0.2 micromoles (glycine equivalents) directly in 2 ml of seawater. Fluorescamine-positive primary amines in the region of Newport Bay, California, range from about 0.3 micromoles in nearshore waters to 14 micromoles in bay sediments. About half the fluorescamine-positive material in New-port Bay water can be taken up rapidly by photoplankton, and thus, may be an important nitrogen source. The half not taken up probably occurs as peptides. Fluorescamine should be invaluable for studies on microbial nutrition and cycling of organic matter in aquatic ecosystems. (Henley-ISWS) W75-06443

THE EFFECT OF INCREASES IN THE AT-MOSPHERIC CARBON DIOXIDE CONTENT ON THE CARBONATE ION CONCENTRATION OF SURFACE OCEAN WATER AT 25C, Liverpool Univ. (England). Donnan Lab For primary bibliographic entry see Field 2K.

PICKLING LIQUORS, STRIP MINES, AND GROUND-WATER POLLUTION, Ohio State Univ., Columbus. Dept. of Geology and Mineralogy. For primary bibliographic entry see Field 5B. W75-06450

OXYGEN AND SULFUR ISOTOPIC COMPOSI-TION OF THE SULFATE IONS FROM MINERAL AND THERMAL GROUNDWATERS OF POLAND,

nitato Nazionale per le Ricerche Nucleari, Pisa Collision Nucleare. G. Cortecci, and J. Dowgiallo. Journal of Hydrology, Vol 24, No 3/4, p 271-282, 1975. 4 fig, 4 tab, 28 ref. Descriptors: *Pollutant identification, *Oxygen isotopes, *Sulfur, Isotope studies, *Sulfur bac-teria, *Analytical techniques, Oxygen. techniques, Oxygen, Radioisotopes, Sulfates, Sulfur compounds, Deuterium, Hydrogen, Saline water, Salinity, Chemical properties, Water quality, Geologic time, Mineralogy, Radiochemical analysis, *Groundwater, Meteoric water, Mineral water, Thermal water.

Identifiers: *Poland, Carpathians, Sudety Mountians, Bacterial fractionation, Graphite-reduction technique.

The 018 and S34 contents were given of the sulfate dissolved in some mineral and thermal groundwaters in northwest Poland, in the Carpathians, in the Carpathian foredeep, and in the Sudety Mountains. The oxygen isotopic composition of sulfate ions were compared with the 018/016 and D/H ratios of the environmental waters. From the results obtained, the oxygen and sulfur isotopic composition of the sulfate ions seems generally due to a sulfate bacterial metabolic activity, which has enriched the residual sulfate in the heavy isotopes. No correlation exists between the delta 018(SO4--) values and the other parameters, such as depth and age of aquifers, outflow temperature, total salinity, sulfate concentration, delta 018, and delta D values of the environmental waters, except for the (SO4--) water pairs with delta 018(H20) greater than 0. In this case there is a positive delta 018(SO4--) - delta 018(H2O) correlation which proves a partial isotopic equilibration and excludes for these waters an admixture with relatively recent infiltration waters. The positive 018 contents of some waters (from +3.0 to +6.7 parts per thousand) analyzed and discussed previously by Dowgiallo (1973) were newly examined in the light of experimental results recently published on the oxygen and hydrogen isotopic fractionation in the ultrafiltration process of water (or aqueous colution) by compacted clay. (Henley-ISWS) W75-06455

SKYLAB STUDY OF WATER QUALITY,

Kansas Univ., Lawrence.

J. R. McCauley. Available from the National Technical Information Service, Springfield, Va 22161 as N74-32764, \$3.25 in paper copy, \$ 2.25 in microfiche. Progress Report, June-August 1974. 9 p, 3 fig, 2 ref. NASA Contract NAS 9-13271.

Descriptors: *Remote sensing, *Data processing, *Water quality, Satellites(Artificial), Lakes, Suspended solids, Photography, Infrared radia-tion, *Kansas, Reservoirs, Correlation analysis. Identifiers: *Skylab.

Earth Resources Environmental Program (EREP) data products thus far received for the September 18, 1973, SL3 pass over southeast Kansas include S-190A positive transparencies. These photos cover three lakes: Toronto, Fall River, and Elk City Reservoirs. Concurrent with satellite over-flight, field crews were on all three lakes collecting water samples. These samples were analyzed for concentrations of bicarbonate, carbonate, calci-um, magnesium, potassium, sodium, sulfate, and chloride. In addition, total solids, total heat-stable solids, suspended solids, heat-stable suspended solids, and pH were determined. The four black and white S-190A products were analyzed quantitatively with a Macbeth EP-1000 macrodensitometer. Five locations were selected on Fall River and Toronto Reservoirs, and four on Elk City Reservoir. Each density measurement was centered as nearly as possible over one or more ground truth sampling station. Attempts were then made to relate film density to corresponding water quality parameters. The analysis established a strong linear correlation between the red/green radiance ratio and suspended solids. This result compared quite favorably to ERTS MSS CCT results. (Sims-ISWS) W75-06478 A PORTABLE AEROSOL DETECTOR OF HIGH

SENSITIVITY, State Univ. of New York, Albany. Atmospheric Sciences Research Center.

A. Hogan, W. Winters, and G. Gardner.

Journal of Applied Meteorology, Vol 14, No 1, p 39-45, February 1975. 2 fig. 3 tab, 21 ref. NOAA contract 044022 and NSF Grant GA32502.

Descriptors: *Pollutant identification, *Aerosols, *Atmosphere, *Instrumentation, *Air pollution, *On-site tests, Dusts, Fog, Clouds, Meteorology, Water vapor, Meteoric water, Analytical techniques, Measurement, Condensation, Nucleation, Calibrations, Suspension.

Identifiers: Diffuser-denuder, Marine atmosphere, *Greenland, Aitken nuclei, Counters,

A portable photoelectric nucleus counter, with similar sensitivity to the Pollak photoelectric nucleus counter with convergent light beam, was developed and calibrated. This instrument was incorporated into a packaged measurement system which allows the experimenter to determine the effective diffusion coefficient and fraction charged, of the natural aerosol, in uncontaminated areas. The photoelectric counter has comparable accuracy to the absolute (Aitken, Scholz) counters in the concentration range of interest, and is capable of determining the concentration once per minute. Field tests of the prototype instrument were conducted near sea level in Greenland. The concentration of natural aerosol in this area ranged from 150 to 200 particles/cu cm. The instrumentation had sufficient sensitivity to detect a gradual increase in particle size at this low concentration. (Henley-(SWS) W75-06496

CALIBRATION OF THE POLLAK COUNTER WITH MONODISPERSE AEROSOLS.

Minnesota Univ., Minneapolis. Particle Technolo-

B. Y. H. Liu, D. Y. H. Pui, A. W. Hogan, and T. A.

Journal of Applied Meteorology, Vol 14, No 1, p 46-51, February 1975. 3 fig, 28 ref, 1 append. NSF Grant GA32502 and EPA Grant 801301.

Descriptors: *Pollutant identification, *Aerosols, *Calibrations, *Instrumentation, *Atmosphere, *Air pollution, Measurement, Dusts, Fog, Mist, Evaluation, Testing, Analytical techniques, Testing procedures, Electronic equipment, Standards, Nucleation. Identifiers: Pollack counter, Monodisperse

The photoelectric condensation nucleus counter of Pollak with convergent light beam was compared with an electrical aerosol detector by using monodisperse aerosols with particle diameters between 0.025 and 0.15 micrometers, particle concentrations between 127 and 260,800/cu cm, and particles of two different chemical constituencies, e.g., NaCl and material volatilized from a heated nichrome wire. Very good agreement was obtained. The discrepancy between these two methods was found to be less than 9% at concentration levels below 10,000 particles/cu cm and 17% at 250,000 particles/cu cm. This discrepancy is well within the combined uncertainties in the two independent aerosol concentration measuring methods. (Henley-ISWS) W75-06497

CHLORIDES IN NATURAL AND ARTIFICIAL HAILSTONES, Istituto di Fisica dell'Atmosfera, Verona (Italy).

Osservatorio Scientifico. For primary bibliographic entry see Field 2B.

Group 5A—Identification Of Pollutants

BACKGROUND SILVER CONCENTRATIONS IN ILLINOIS PRECIPITATION AND RIVER WATER

Illinois State Water Survey, Urbana.

Journal of Applied Meteorology, Vol 14, No 2, p 217-221, March 1975. 2 fig. 3 tab, 18 ref. Contract INT D-7197; AEC Contract AT(11-1)-1199.

Descriptors: *Pollutant identification, *Silver seeding, iodide, *Cloud seeding, *Precipitation(Atmospheric), *Rivers, On-site investigations, Sampling, Water chemistry, Analytical techniques, Chemical analysis, Chemistry, *Illinois.

Identifiers: Dry deposition.

Work was undertaken to measure background silver in Illinois precipitation in the absence of any known seeding operations in or near Illinois. The rainfall-weighted mean concentration in samples from several stations was 73 ng/1. somewhat higher than has been found in unseeded precipitation in other parts of North America, but not high enough to preclude wind-blown soil dust as a primary source. (Sims-ISWS) W75-06506

IDENTIFICATION AND DETERMINATION OF TRACE AMOUNTS OF ORGANIC AND INOR-GANIC CONTAMINANTS IN THE DELAWARE RIVER AND BAY, Delaware State Coll., Dover. Dept. of Chemistry.

G. R. Seidel.

Available from the National Technical Informa-tion Service, Springfield, Va 22161 as PB-241 059, 33.75 in paper copy, \$2.25 in microfiche. Comple-tion Report, November 1974, 26 p. OWRT A-019-DEL(1)

Descriptors: *Delaware River, Organic Compounds, *Insecticides, Inorganic compounds, *Trace elements, *Pollutant identification, *Chlorinated hydrocarbon pesticides, *Pesticide residues, Polychlorinated biphenyls, Mass spectroscopy.
Identifiers: *Delaware Bay, Metallic ions.

The waters and bottoms of Delaware River, Bay, and a number of fresh water bodies were analyzed for chlorinated insecticides and metallic ions These are reported and reflect the health or lack of it of these water resources. A research gas chromatograph (Micro-Tek, Model 220) equipped with an electron capture detector and all glass system was used for determining the chlorinated insecticides; a dual beam atomic absorption spec trophotometer (Jarrell Ash Model 810) was used for measuring the content of metallic ions. Data have been obtained which might become a starting point for: (1) further analyses to determine whether or not the bodies of water studied are becoming more or less contaminated, (2) to serve as an incentive to study additional lakes, rivers and tidal areas to measure their extent of contaminatio

THE EFFECT OF ALCOHOLS ON THE CAR-BONIC ACID DEHYDRATION REACTION. Oklahoma Univ., Norman. Dept. of Chemistry. G. Atkinson, R. C. Patel, and R. J. Boe. Available from the National Technical Informa-tion Service, Springfield, Va 22161 as PB-241 130, \$4.25 in paper copy, \$2.25 in microfiche. Completion Report, (March 1975). 53 p, 12 fig, 4 tab, 5 ref. OWRT A-045-OKLA(1). 14-31-0001-4036.

Descriptors: *Dehydration, Kinetics, Carbon dioxide, Activation energy, Chemical reactions, Ions, Ion exchange. Identifiers: *Carbonic acid, Debye-Huckel theory, MgCl2-NaHCO3 mixtures.

The carbonic acid dehydration kinetics have been studied by the stopped-flow technique

CH3OH/H2O and t-BuOH2O mixtures. Precise values of the activation parameters delta G(++), delta H(++), and delta S(++) have been obtained. CH3OH has a very minor effect on the dehydration process except in the very low organic range. The addition of t-BuOH has a marked effect on the process with delta H(++) showing a maximum near Xo=0.06 and delta S(++) going from negative to positive at the same concentration. The chemical interactions of Mg+2 with carbonate and bicarbonate in the presence of the Na+ ion have been studied as a function of temperature ranging from 0-30C and of ionic strength varying from 0.15 to 0.64 M. In the case of MgCO3 ion pair forma tion, a constant enthalpy of reaction was observed in the temperature range investigated. In the case of MgHCO3+ ion pair formation, the association constant shows a minimum around 20C. Within experimental error, the effect of ionic strength on the ion pair formation processes is in line with the Debye-Huckel theory in its extended form. The NaCO3 and NaHCO3 ion pair formation constants in the absence of the Mg+2 ion have been determined at 20C. The values are 0.5 M-1 with an ionic strength of 0.36 M and 4.4 M-1 at 0.19 M, respectively. The calculations were based on the EMF measurements using the glass and the ion-selective electrodes. W75-06521

PUBLIC GROUNDWATER SUPPLIES IN MASON COUNTY, Illinois State Water Survey, Urbana.

For primary bibliographic entry see Field 4B. W75-06527

PUBLIC GROUNDWATER SUPPLIES IN STARK COUNTY, Illinois State Water Survey, Urbana For primary bibliographic entry see Field 4B.

GROUNDWATER SUPPLIES IN PERRY COUNTY,
Illinois State Water Survey, Urbana For primary bibliographic entry see Field 4B. W75-06529

A LIMNOLOGICAL STUDY OF SILVERWOOD LAKE: IMPACT OF WATER TRANSPORT ON WATER QUALITY, California State Polytechnic Univ., Pomona.

R. Kubomoto, J. Miller, and R. Wothington. American Water Works Association Journal, Vol 66, No 11, p 663-667, November 1974. 4 fig, 3 tab,

Descriptors: *Limnology, *Lakes, *Water quality, Physical properties, Chemical properties, Biological properties, *Water transfer, Multiple-purpose reservoirs, Turbidity, Dissolved oxygen, Tem-perature, Pollutants, *Pollutant identification, Algae, Fish, Recreation, Reservoirs, *California. Identifiers: *Silverwood Lake*Calif).

When state agencies involved with the California Water Project realized the major need for more recreational areas in southern California, they designed Silverwood Lake, located near the headwaters of the west fork of the Mojave River, as a multipurpose reservoir. The water-quality study of Silverwood Lake was undertaken to determine (1) if there was a significant deterioration of water quality as the northern water moved to the south, (2) if the movement of northern water to the south was introducing different species of phytoplank-ton into the southern California water system, (3) if the use of the lake as a recreational area was sigif the use of the lake as a recreational area was significantly affecting the quality of the water, and (4) if there was a possibility that the lake would develop a monomictic or dimictic pattern of stratification. The period of testing extended from October 1972 through February 1973. Samples were obtained from three locations on the lake. No major detriments due to importation of water are obvious, and the effects of recreational use of the reservoir are negligible. If maintained at the current level of use and quality of imported water. Silverwood Lake will provide many years of recreational use and water supply. (Sims-ISWS) W75-06538

SEA SALT PARTICLES TRANSPORTED TO THE LAND, Hokkaido Univ., Sapporo (Japan). Dept. of

Chemistry.
For primary bibliographic entry see Field 5B. W75-06541

FUNDAMENTALS OF AQUATIC BIOASSAYS, Ministry for Conservation, Melbourne (Australia). Westernport Bay Environmental Study.

Proceedings of the Royal Australian Chemical Institute, Vol 42, No 2, p 50-54, February 1975. 4 fig, 24 ref.

Descriptors: *Bioassay, *Toxicity, *Water pollution effects, "Testing procedures, Aquatic animals, Water quality, Laboratory tests, Fish, Graphical analysis, Analytical techniques, Water analysis, Water pollution control, "Pollutant identification.

A review is presented of the principles and methods of bioassays in application to pollution control and environmental monitoring. Both acute and chronic toxicity tests, conducted in static and flowing water, are considered; the selection and handling of test animals, requirements for equip ment, methods of analysis and presentation of results are discussed. It is emphasized that accepted standards for procedures, analysis and re-porting are necessary if the information is to be efficiently used by water-resource managers and policy makers. (Levick-CSIRO) W75-06554

STEADY-STATE WATER QUALITY MODEL-ING IN STREAMS,
Cornell Univ., Ithaca, N.Y. School of Civil and
Environmental Engineering. For primary bibliographic entry see Field 5B. W75-06564

AERIAL RADIOLOGICAL MEASURING SUR-VEY OF THE MAINE YANKEE ATOMIC POWER PLANT SEPTEMBER 1971.

EG and G, Inc., Las Vegas, Nev.

Available from NTIS, Springfield, Va 22161 as

Rept. No. ARMS-71.65, \$4.00 in paper copy, \$2.25

in microfiche. Atomic Energy Commission,

Divison of Operational Safety Report No. ARMS71.6.5, August 1974. 22 p, 3 fig, 3 tab, 3 ref.

*Surveys, *Monitoring. Descriptors: *Measurement, *Radioactivity, *Remote sensing, Aerial sensing, Aircraft, Nuclear powerplants, Data collections, Sites, Background radiation, Fal-lout, Public health, Maine. Identifiers: *Maine Yankee Atomic Power Plant, Gamma Radiation

Aerial Radiological Measuring System (ARMS) was used to survey the area surrounding the Maine Yankee Atomic Power Plant during September 1971, prior to reactor start-up. The survey measured terrestrial gamma radiation. A high sensitivity detection system collected gamma-ray spectral and gross-count data. The data were then computer processed into a map of 530 square mile area showing isoexposure contours three feet above the ground. Exposure rates and isotopes identified are consistent with normal terrestrial background radiation. (Houser-ORNL)

Identification Of Pollutants—Group 5A

AERIAL RAIOLOGICAL MEASURING SUR-VEY OF THE FORT ST. VRAIN NUCLEAR GENERATING STATION OCTOBER 1971, FG and G. Inc., Las Vegas, Nev.

EG and G, Inc., Las vegas, Nev. Available from the National Technical Information Service, Springfield, Va 22161, as Rept. No ARMS-72.6.9, \$4.00 in paper copy, \$2.25 in microfiche. Atomic Energy Commission, Division of Operational Safety Report No ARMS-72.6.9, August 1974. 22 p, 3 fig, 3 tab, 3 ref.

Descriptors: *Colorado, *Radioactivity,
*Measurement, *Surveys, *Remote sensing,
*Aerial sensing, Aircraft, Assessment,
Background radiation, Data collections,
Radioisotopes, Nuclear powerplants, Effluents,
Fallout, Public health.

Identifiers: *Fort St. Vrain Nuclear Generating Station(Colo), Gamma radiation.

The Aerial Radiological Measuring System (ARMS) was used to survey the area surrounding the Fort St. Vrain Nuclear Generating Station during October, 1972, prior to reactor start-up. The survey measured terrestrial gamma radiation. A high-sensitivity detection system collected gamma-ray spectral and gross-count data. The data were then computer processed into a map of a 670 square mile area showing isoexposure contours three feet above the ground. Exposure rates and isotopes identified are consistent with normal terrestrial background radiation. (Houser-ORNL) W75-06631

AERIAL RADIOLOGICAL MEASURING SUR-VEY OF THE PRAIRIE ISLAND NUCLEAR GENERATING PLANT SEPTEMBER 1971,

EG and G, Inc., Las Vegas, Nev. Available from the National Technical Information Service, Springfield, Va 22161, as Rept No ARMS-71.6.2, \$4.00 in paper copy, \$2.25 in microfiche. Atomic Energy Commission, Division of Operational Safety Report No ARMS-71.6.2, August 1974. 22 p, 3 fig, 3 tab, 3 ref.

Descriptors: *Minnesota, *Surveys, *Monitoring, *Measurement, *Nuclear powerplants, *Effluents, *Radioactivity, Remote sensing, Aerial sensing, Aircraft, Sampling, Data collections, Sites, Fallout, Public health, Background radiation.

Identifiers: *Prairie Island Nuclear Generating

Identifiers: *Prairie Island Nuclear Generating Plant(Minn), Gamma radiation.

The Aerial Radiological Measuring System (ARMS) was used to survey the area surrounding the Prairie Island Nuclear Generating Plant during September 1971, prior to reactor start-up. The survey measured terrestrial gamma radiation. A high-sensitivity detection system collected gamma-ray spectral and gross-count data. The data were then computer processed into a map of an 800 square mile area showing isoexposure contours three feet above the ground. Exposure rates and isotopes identified are consistent with normal terrestrial background radiation. (Houser-ORNL)

AERIAL RADIOLOGICAL MEASURING SUR-VEYS OF THE TURKEY POINT STATION APRIL 1972,

APRIL 1972, EG and G, Inc., Las Vegas, Nev. Available from the National Technical Information Service, Springfield, Va 22161, as Rept No ARMS-72.6.2, \$4.00 in paper copy, \$2.25 in microfiche. Atomic Energy Commission, Division of Operational Safety Report No ARMS-72.6.2, July 1974. 22 p, 3 fig, 3 tab, 3 ref.

Descriptors: *Florida, *Radioactivity, *Measurement, *Remote sensing, *Surveys, *Aerial sensing, Aircraft, Assessment, Radioisotopes, Background radiation, Data collection, Nuclear powerplants, Effluents, Public health, Background radiation. Lidentifiers: *Turkey Point Nuclear Power Station(Fla), Gamma radiation.

The Aerial Radiological Measuring System (ARMS) was used to survey the area surrounding the Turkey Point nuclear power station during April 1972, prior to reactor start-up. The survey measured terrestrial background gamma radiation. A high-sensitivity detection system collected gamma-ray spectral and gross-count data. The data were then computer processed into a map of a 175 square mile area showing isoexposure contours three feet above the ground. Exposure rates and isotopes identified are consistent with normal terrestrial background radiation. (Houser-ORNL) W75-06633

AERIAL RADIOLOGICAL MEASURING SUR-VEY OF THE PILGRIM STATION SEPTEMBER

EG and G, Inc., Las Vegas, Nev. Available from the National Technical Information Service, Springfield, Va 22161, as Rept No ARMS-71.6.4, \$4.00 in paper copy, \$2.25 in microfiche. Atomic Energy Commission, Division of Operational Safety Report No ARMS-71.6.4, August 1974. 22 p, 3 fig, 3 tab, 3 ref.

Descriptors: *Massachusetts, *Radioactivity,
*Measurement, *Assessment, *Surveys, *Remote
sensing, Aerial sensing, Aircraft, Nuclear powerplants, Effluents, Fallout, Public health,
Background radiation.
Identifiers: *Pilgrim Nuclear Power Station(Mass), Gamma radiation.

The Aerial Radiological Measuring System (ARMS) was used to survey the area surrounding the Pilgrim nuclear power station during September 1971, prior to reactor start-up. The survey measured terrestrial background gamma radiation. A high-sensitivity detection system collected gamma-ray spectral and gross-count data. The data were then computer processed into a map of 230 square mile area showing isoexposure contours three feet above the ground. Exposure rates and isotopes identified are consistent with normal terrestrial background radiation. (Houser-ORNL)

AERIAL RADIOLOGICAL MEASURING SUR-VEY OF THE INDIAN POINT STATION AU-GUST 1969.

GUST 1969, EG and G, Inc., Las Vegas, Nev.

Available from the National Technical Information Service, Springfield, Va 22161, as Rept No ARMS-69.6.4, \$4.00 in paper copy, \$2.25 in microfiche. Atomic Energy Commission, Division of Operational Safety Report No ARMS-69.6.4, July 1974. 22 p, 3 fig, 3 tab, 3 ref.

Descriptors: "New York, "Radioactivity,
"Measurement, "Surveys, "Assessment, "Remote
sensing, Aerial sensing, Aircraft, Nuclear powerplants, Effluents, Fallout, Public health, Gases,
Background radiation.
Identifiers: "Plume track, "Indian Point Sta-

Identifiers: *Plume track, *Indian Point Station(NY), Gamma radiation.

The Aerial Radiological Measuring System (ARMS) was used to survey the area surrounding the Indian Point Station during August 1969. The survey measured terrestrial background gamma radiation and included an attempt to detect stack release gases. A high-sensitivity detection system collected gamma-ray spectral and gross-count data. The data were then computer processed into a map of 625 square mile area showing isoexposure contours three feet above the ground. Exposure rates and isotopes identified in the area survey are generally consistent with normal terrestrial background. A single point source of low energy photons, possibly an x-ray machine, was observed near the edge of the area. The plume assay revealed no radioactivity other than normal background. (Houser-ORNL)

EVALUATION OF METHODS FOR DETECTING COLIFORMS AND FECAL STREPTOCOCCI IN CHLORINATED SEWAGE EFFLUENTS, Illinois State Water Survey, Urbana.
S. D. Lin.

Report of Investigation No. 78, 1974. 23 p, 13 fig, 10 tab, 41 ref, 4 append.

Descriptors: "Sewage effluents, "Sewage bacteria, "Coliforms, "E. coli, "Streptococcus, Water pollution effects, Microbiology, Evaluation, Chlorination, Sewage treatment, Sanitary engineering, Laboratory tests, Environmental engineering, "Pollutant identification.
Identifiers: "Chlorinated sewage, "Secondary sewage effluents, Detection methods

Total coliform (TC), fecal coliform (FC), and fecal streptococcus (FS) recoveries in chlorinated secondary sewage effluents were investigated by the membrane filter (MF) and multiple-tube (most probable number, MPN) methods. The LES twostep MF method was found to be comparable to the MPN procedure for determining TC. The TC detection was 1.5 times greater by the LES twostep technique than that obtained by the M-Endo one-step MF procedure. Fecal coliform recovery by the M-FC MF procedure was lower than the recovery obtained by the MPN method. Azidedextrose broth, brain-heart infusion broth, and peptone yeast-extract casitone used separately with the M-Enterococcus agar MF2 (2-day incubation) procedure were not satisfactory for the recovery of FS. The M-Enterococcus agar procedure with bile broth enrichment (MF2) or prolonged incubation for 3 days (MF3) significantly increased FS recovery and both were com-parable to the MPN method. The results cited should be useful in assessing the efficiency of disinfection practices for waste treatment plants employing effluent chlorination. (Poertner) W75-06654

MEASUREMENT OF MANGANESE IN NATU-RAL WATERS BY ATOMIC ABSORPTION, Mississippi State Univ., Mississippi State.

Mississippi State Univ., Mississippi State. L. R. Robinson, R. A. Dixon, and E. D. Breland. Water and Sewage Works, February 1968. p 80-82, 1 tab, 8 ref.

Descriptors: *Spectroscopy, *Chemical analysis, *Analytical techniques, *Moss spectrometry, *Qualitative analysis, *Pollutant identification, Inorganic compounds, Instrumentation, Water analysis, Manganese. Identifiers: Atomic absorption spectroscopy.

Atomic absorption spectroscopy provides a rapid, reproducible, sensitive method to quantitatively measure manganese. Atomic absorption measures energy as it is absorbed by an atomic vapor. As a sample is sprayed into a flame and atomized, a light beam, with a resonance wave length identical to that of the element to be measured, is directed through the flame, into a monochromator, and then into a detector. The detector measures the final intensity of the beam. The amount of light absorbed, or the decrease in light intensity reaching the detector, is proportional to the concentration of the element in the sample. Techniques for quantitating manganese were found to be rapid, simple, and reproducible. The technique is outlined and all steps, such as reagents, sample collection, concentration, and measurement, are described. Where ese concentrations are below the minimum sensitivity of the instrument used, a concentration technique can be used to produce satisfactory results. (Poertner) W75-06658

POTAMOLOGICAL STUDIES ON THE RIVER INA OF THE RIVER SYSTEM OF YODO: 1 (IN JAPANESE).

JAPANESE), Osaka Kyoiku Univ. (Japan). Oceanography Lab. For primary bibliographic entry see Field 5B. W75-06701

Group 5A—Identification Of Pollutants

DISSOLVED ORGANIC MATERIAL IN THE ST. LAWRENCE MARITIME ESTUARY: COM-PARISON AND CHOICE OF METHODS (IN FRENCH),

D. Cauchois, and M. Khalil. J Fish Res Board Can. Vol 31, No 2, p 133-139, 1974, Illus, English summary.

Descriptors: *Estuaries, *Pollutants, Analytical techniques, *Separation techniques, Hydrocarbons, *Sea water, Chlorine compounds, Organic wastes, Chemical wastes.

Identifiers: *St-Lawrence estuary.

To study quantitatively and qualitatively the dissolved organic matter in the St. Lawrence maritime estuary, a comparison between the different extracting methods was undertaken. Two of them are proposed; 1 based on liquid-liquid extraction, the 2nd by adsorption on a resin (Amberlite XAD-2). The methods used remove different spectrums of organic compounds from sea water. Hydrocarbons were found to constitute the major part of the extracts varying between 3 and 5 mg/l. None of the methods used extracts more than 20% of the total organic matter present. The concentration of the organic chloro-compounds in the water column is in the order of 80 ppb.—Copyright 1974, Biological Abstracts, Inc.

THE USE OF A MODIFIED GULF V PLANK-TON SAMPLER FROM A SMALL OPEN BOAT, Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Lab. For primary bibliographic entry see Field 7B. W75-06707

AN AIR-LIFT FOR QUANTITATIVE SAM-PLING OF THE BENTHOS, Hull Univ. (England). Dept. of Zoology. For primary bibliographic entry see Field 7B. W75-06713

MARINE ALPHA-RADIOACTIVITY OFF SOUTHERN AFRICA: 3. POLONIUM-210 AND LEAD -210, Department of Industries, Cape Town (South

Department of Industries, Cape Town (South Africa). Div. of Sea Fisheries.
L. V. Shannon.

L. V. Shannon.

S Afr Div Sea Fish Invest Rep. 100. p 1-34, 1973,

Identifiers: *Africa(Cape of Good Hope), Chemicals, *Electro deposition, Fish, Food, *Lead-210, Marine organisms, Oceanographic studies, Phytoplankton, *Polonium-210, *Radioactivity, Salinity, Tracers, Zooplankton, *Solvent extraction, *Pollutant identification, Sea water.

A method is outlined for the determination of Pb-210 and Po-210 in sea-water by solvent extraction followed by electrodeposition and alpha-counting. The mean activities of Pb-210 and Po-210 in seawater samples collected at a depth of 20 m in the sea around the Cape of Good Hope during March 1969, were 38 x 10 to the 15 power Ci/1 and 20 x 10 to the minus 15 power Ci/1, respectively. Variations in the concentrations of these nuclides could in part be ascribed to different water masses and current systems. Unsupported Po-210 in 387 samples of marine organisms, collected from 1967-1969 within 1000 miles of Southern Africa was determined by repeated total alpha-counting. In addition, Pb-210 and Po-210 in 13 zooplankton, 4 phytoplankton and 6 pelagic fish samples collected during 1969 were determined by chemical extraction, electrodeposition and alpha-counting. mean values for lead-210 and polonium-210 in the zooplankton samples were 31 pCi/kg wet material and 380 pCi/kg wet material, respectively. In zooplankton the Pb-210 activity was on the average 1/12 of the Po-210 activity. The concentration of Po-210 in marine life increased along the food chain. Po-210 in sea-water and plankton appears to be closely related to the distribution of

salinity and the possible utility of Po-210 as a natural oceanographic tracer is discussed.--Copyright 1974, Biological Abstracts, Inc.

DATA ON THE HYDROBIOLOGICAL RELATIONSHIPS OF THE BACKWATER OF THE BODROG RIVER NEAR SAROSPATAK: I. PRELIMINARY STUDIES ON THE DETERMINATION OF CHARACTERISTICS OF OXYGEN AND CARBON DIOXIDE BALANCE IN THE BACK-WATER, Lajos Kossuth Univ., Debrecen (Hungary).

Lajos Kossuth Univ., Debrecen (Hungary). Zoological Inst. G. Devai, I. Devai, K. Horvath, I. Bancsi, and M.

Toth.
Acta Biol Debrecina. 7/8. p 210-222, 1969/70(1971),
Illus, English summary.

Descriptors: *Rivers, *Water *Backwater, Aquatic life, *Oxygen, *Carbon dioxide, Europe, Ecology.
Identifiers: *Hungary(Bodrog River), Hydrobiological relationships, Sarospatak.

This 1st part of a series of hydro-ecological papers is concerned with water analysis of the backwater of the river Bodrog, near Sarospatak (NE-Hungary). The purpose of this paper is to demonstrate that even in those backwaters that are characterized by a regular hydro-dynamism there are many trends which may be due to the periodical activity of living organisms. Necessity of simultaneous measurements of O2 and CO2 data is shown.--Copyright 1973, Biological Abstracts, Inc. W75-06720

STUDY OF PRIMARY OXYGEN PRODUCTION IN THE HUNGARIAN SECTION OF THE DANUBE (DANUBLALIA HUNGARICA LYHI), Magyar Tudomanyos Akademia, Budapest. Station for Danube Research. Z. T. Dvihally.

Ann Univ Sci Budap Rolando Eotvos Nominatae Sect Biol. 13, p 33-43, 1971, Illus.

Descriptors: *Rivers, Europe, *Oxygen, Analytical techniques, *Flow rates, *Primary productivity, *Pollutant identification.
Identifiers: Austria, *Danube River(Humgary).

Measurements of O2 production potential in laboratory and in situ in the Hungarian section of the Danube river are described. The differences observed in the O2 production potentials of the Austrian and Hungarian sections of the river appear to be due to differences in the flow speeds. The primary O2 production of the water was inversely proportional to the flow speed. The differences between the maxima and minima of the daily O2 production as obtained from 24-hr-measurements ranged from 3.2 mg/1 to 7.5 mg/1 in different months.—Copyright 1973, Biological Abstracts, Inc.

SUMMARY REPORT OF MICROBIOLOGICAL BASELINE DATA ON LAKE SUPERIOR, 1973, Canada Centre for Inland Waters, Burlington (Ontario).

For primary bibliographic entry see Field 2H. W75-06738

RADIONUCLIDE LEVELS IN THE GREAT LAKES WATERS - 1973, Canada Centre for Inland Waters, Burlington

(Ontario). R. W. Durham. Scientific Series No. 48, 5 p, 1974, Inland Waters Directorate. 2 fig, 5 ref, 2 tab.

Descriptors: *Great Lakes, *Surveys, *Radioactivity, Radioactive wastes, Monitoring, Sampling, Measurement, Cesium, Testing

procedures, Lake Huron, *Canada, *Pollutant identification.

Identifiers: *Radionuclides, Nuclear power, Spectrometry, Antimony, Douglas Point(Ont), Pickering(Ont).

The only artificially produced radionuclides detected in the waters of the Great Lakes by gamma ray spectrometry using a large volume Ge(Li) detector were 137CS and 125SB. The radioactivity levels of these radionuclides in the open waters of the lakes were measured during the spring and summer of 1973. Similar measurements were made at the plume-lake interface of the Ontario Hydro nuclear generating stations at Douglas Point and Pickering. The results of all the measurements were quite low with a range of 14-87 PCI/cu. m. for 137CS and 41-124 PCI/cu. m. for 125SB. (Environment Canada) W75-06744

INTERLABORATORY QUALITY CONTROL STUDY NO. 7 - MAJOR CATIONS AND ANIONS, Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 2K.
W75-06747

AN ASSESSMENT OF AREAL AND TEMPORAL VARIATIONS IN STREAMFLOW QUALITY USING SELECTED DATA FROM THE NATIONAL STREAM QUALITY ACCOUNTING NETWORK, Geological Survey, Reston, Va. For primary bibliographic entry see Field 5B.

REMOTE SENSING, Bureau of Reclamation, Washington, D.C. For primary bibliographic entry see Field 7B. W75.06775

HEALTH AND SAFETY LABORATORY FAL-LOUT PROGRAM, QUARTERLY SUMMARY REPORT (JUNE 1, 1974 THROUGH SEP-

TEMBER 1, 1974), Health and Safety Lab. (AEC), New York. E. P. Hardy. Jr.

Available from NTIS, Dept. of Comm., Springfield, Va 22161 as Rept. No. HASL-286, \$7.60 in paper copy, \$2.25 in microfiche. Report No. HASL-286, October 1974. 176 p, 39 fig, 55 tab, 19 ref, 5 append.

Descriptors: *Fallout, *Surveys, *Monitoring, *Radioactivity, *Data collections, Publications, Laboratories, Air pollution, Soil contamination, Depth, Distribution, Background, Radiation, Human population, Public health, Diets, Sediments, Oceans, Land, Cesium, Strontium, Plutonium, Milk, Domestic water, Bibliographies. Identifiers: *Taiwan, *New Zealand.

Current data are presented from the Health and Safety Laboratories Program, the Institute of Nuclear Science in Taiwan, and the National Radiation Laboratory in New Zealand. Interpretive reports and notes are presented on depth distribution of artificial radionuclides in soil, alpha contribution to beta background, global deposition of Sr 90 through 1973, fallout plutonium in diet, strontium 90 in human bone, sediment sampling near Mound Laboratory, Miamisburg, Ohio and ocean vs. land strontium 90 fallout. Tabulations are included of radionuclide levels in fallout, surface air, milk, diet, and tap water. A bibliography of recent publications related to radionuclide studies is also presented. (See W75-06795 thru W75-06807) (Houser-ORNL)

Identification Of Pollutants-Group 5A

DEPTH DISTRIBUTIONS OF GLOBAL FAL-LOUT SR90, CS137, AND PU239, 240 IN SANDY LOAM SOIL,

Health and Safety Lab. (AEC), New York.

E. P. Hardy, Jr. In: Report No. HASL-286, p I-2 - I-10, October 1974. 1 fig, 4 tab, 5 ref.

Descriptors: *Soil contamination, *Radioactivity, Depth, *Profiles, Analysis, Strontium, Cesium, Plutonium, Migration, *Distribution, Radioisotopes, Movement, *Sampling, *Massachusetts, Path of pollutants. Identifiers: *Cape Cod(Mass).

The first of a series of depth profile soil samples taken at an undisturbed site on Cape Cod have been analyzed for Sr90, Cs137, and Pu239, 240. Cesium 137 shows the least tendency to migrate downward followed by Pu239, 240 and Sr90, in that order. The objective of this experiment is to measure the depth distributions of these isotopes on a bi-annual basis to estimate rate of movement. (See also W75-06794) (Houser-ORNL) W75-06795

ALPHA CONTRIBUTION TO BETA BACKGROUND---A FOLLOW-UP STUDY, Health and Safety Lab. (AEC), New York.

1. M. Fisenne, and H. W. Keller.

In: Report No. HASL-286, p 1-11 - 1-16, October 1974, 2 tab, 3 ref.

Descriptors: *Background radiation,
*Measurement, Instrumentation.
Identifiers: Low level radiation, *Yttrium.

Contributions to low level background have been investigated in an attempt to pinpoint the sources. Of primary interest is the reduction of the beta scintillation counter background used for yttrium 90 measurements. (See also W75-06794) (Houser-ORNL) W75-06796

WORLDWIDE DEPOSITION OF SR 90 THROUGH 1973,

Health and Safety Lab. (AEC), New York. H. L. Volchok, and L. Toonkel. In: Report No. HASL-286, p I-17 - I-35, October 1974. 4 fig, 4 tab, 12 ref.

Descriptors: *Fallout, *Strontium, *Radioactivity, *Measurement, Sampling, Radiochemical analysis, Analytical techniques, Evaluation, Surveys, Seasonal, Data collections, Nuclear explosions, Testing.

The total Sr 90 fallout on the earth's surface in 1973 was 63 kilocuries. This is the lowest since the Health and Safety Laboratory program began in 1958. The seasonal and latitudinal variations have remained as before. Approximately double this amount of Sr 90 is anticipated to be deposited in 1974. Data collected by the United States and the United Kingdom are compared. (See also W75-06794) (Houser-ORNL) W75-06794) (Houser-ORNL)

FALLOUT PU 239, 240 IN DIET, Health and Safety Lab. (AEC), New York. B. G. Bennett. In: Report No. HASL-286, p I-36 - I-52, October 1974. 6 tab, 13 ref.

Descriptors: *Fallout, *Plutonium, *Measurement, *Assay, *Diets, Food chains, Human population, Public health, Digestion, Sampling, Foods, Fish, Milk, Path of pollutants, Potatoes, Soil contamination, Drinking water, Vegetable crops, Grains(Crops).

Ingestion intake of fallout Pu 239, 240 in New York in 1972 has been determined from a complete diet sampling. Concentration of plutonium in the

19 food categories ranged from .01 pCi/kg in shell fish to below the minimum detection level in milk. Annual intake in total diet is estimated to have been 1.5 pCi in 1972. Further analyses of Pu in wheat have been completed, and an uptake estimate is made for Pu in potatoes. Recent results for Pu in tap water are also reported. (See also W75-06794) (Houser-ORNL)

STRONTIUM-90 IN THE HUMAN BONE, 1973 RESULTS FOR NEW YORK CITY AND SAN FRANCISCO.

Health and Safety Lab. (AEC), New York. B. G. Bennett.

In: Report No. HASL-286, p I-53 - I-70, October 1974, 5 fig. 5 tab. 15 ref.

Descriptors: *Strontium, Human population, *Assessment, *Assay, Biology, Absorption, Food chains, Model studies, Growth stages, Diets, Surveys, Behavior, Retention, *California, New York.

Identifiers: *New York City, *San Francisco, *Human bone, Young, Adult.

Results are presented of determinations of Sr 90 content of 229 specimens of human vertebrae obtained during 1973 in New York City and San Francisco. The average Sr 90 to Ca ratios for adult vertebrae are 1.35 pCi/gCa in New York and .80 pCi/gCa in San Francisco, about 3% less than the average values of the previous year. Average Sr 90 concentrations in children's bone are now little different from the adult values. A two compartment bone model, which accounts for both short and long term retention of Sr 90 in bone, is used to describe the variations of Sr 90 content of bone and provide correlation with dietary Sr 90 intake. Regression analysis of the 13 years of survey data provides values of the relative retention of dietary Sr 90 and the effective bone turnover rates. The bone model gives satisfactory description of observed Sr 90 levels and allows reliable assessment of the long-term behavior of Sr 90 in man. (See also W75-06794) (Houser-ORNL) W75-06799

SEDIMENT SAMPLING NEAR MOUND LABORATORY - JULY 1974, Health and Safety Lab. (AEC), New York. H. L. Volchok, and J. C. Burke. In: Report No. HASL-286, p 1-71 - 1-81, October 1974. 1 fig. 2 tab. 2 ref.

Descriptors: *Sediments, *Sampling, Analysis, *Plutonium, *Ponds, Canals, Freshwater, Behavior, Evaluation, Public health, Water pollution, *Ohio.

Identifiers: *Mound Laboratory(Ohio).

Eight large diameter sediment cores and 16 water samples were taken from local water bodies in the vicinity of Mound Laboratory, Miamisburg, Ohio: The North and South Ponds and the Miami-Erie Canal. These samples will be analyzed for plutonium and other chemical and physical properties to determine the geochemical behavior of plutonium in a fresh water system. (See also W75-06794) (Houser-ORNL) W75-06800

IS THERE EXCESS SR90 FALLOUT IN THE OCEANS.

OCEANS, Health and Safety Lab. (AEC), New York. H. L. Volchok.

In: Rept. No. HASL-286, p I-82 - I-89, October 1974. 16 ref.

Descriptors: *Fallout, *Strontium, *Oceans, *Measurement, *Radioactivity, *Atlantic Ocean, Depth, Profiles, Data collections, Assessment, Evaluation, Research and development.

Atlantic Ocean concentration depth profiles continue to suggest greater Sr90 deposition, per unit area, than for adjacent land bodies. Extrapolating from this to all oceans results in much more Sr90 than was reportedly produced. The pertinent land, atmospheric and oceanic evidence are reviewed hopefully to stimulate research toward a resolution to the problem. (See also W75-06794) (Houser-ORNL) W75-06801

ENVIRONMENTAL RADIOACTIVITY SUR-VEYS FOR NUCLEAR POWER PLANTS IN NORTH TAIWAN,

National Taiwan Univ., Taipei. Health Physics

P-S. Weng, T-C. Chu, C-S. Hsu, H-T. Chang, and K-L. Pang.

In: Report No. HASL-286, p III-2 - III-24, October 1974. 16 fig. 15 tab, 1 ref.

Descriptors: *Monitoring, *Radioactivity,
*Nuclear powerplants, Construction,
*Background radiation, *Nuclear explosions,
Testing, Fallout, Sampling, Air pollution, Sites,
Water wells, Ground water, Rain, Meteorology,
Silts, Vegetation, Vegetables, Soil contamination,
Oceans, Aquatic life, Biota.
Identifiers: China, *Taiwan, Dosimetry.

This report is the continuation of environmental radioactivity monitoring for the nuclear power plants in North Taiwan which are under construction. During this monitoring period, the fifteenth nuclear weapon test was held at Lop Nor of mainland China on June 27, 1973 and caused significant increase in radioactivity. Several thermoluminescent dosimeters monitoring stations have been established as compared with the previous years, and low volume air samples were added to monitor airborne particulates in addition to the gummed films and pots. (See also W75-06794) (Houser-ORNL)

ENVIRONMENTAL RADIOACTIVITY ANNUAL REPORT 1973 (NEW ZEALAND).

National Radiation Lab., Christchurch (New Zealand). Dept. of Health. In: Report No. HASL-286, p III-25 - III-66, October 1974. 12 fig, 15 tab.

Descriptors: *Monitoring, Environment, *Radioactivity, Measurement, *Nuclear explosions, *United States, Testing, Fallout, Strontium, Cesium, Bioindicators, Bioassay, Milk. Identifiers: *New Zealand, *France, *USSR.

During 1973, country-wide average deposition of strontium 90 on New Zealand was the lowest since measurements commenced in 1960. A maximum country-wide average level of 3.6 millicuries per square kilometre was deposited in 1964 following the large scale U.S.S.R. and U.S.A. nuclear tests in 1961 and 1962. Annual deposits thereafter decreased to a minimum of 0.8 mCi/sq km in 1968. Smaller increases reaching a maximum annual deposit of 1.4 mCi/sq km occurred in the next few years as a result of French nuclear tests in the South Pacific. During 1973, however, the countrywide average deposit decreased to 0.3 mCi/sq km, less than one-tenth the 1964 maximum. It is estimated that at the end of 1973 about 20% of the total strontium 90 deposition on New Zealand had come from French tests in the South Pacific. The concentration of strontium 90 and cesium 137 in milk reflect the changes in fallout deposition. The average levels during 1973 were the lowest since measurements commenced. (See also W75-06794) (Houser-ORNL) W75-06803

APPENDIX TO HEALTH AND SAFETY LABORATORY FALLOUT PROGRAM, QUAR-

Group 5A—Identification Of Pollutants

TERLY SUMMARY REPORT (JUNE 1, 1974 THROUGH SEPTEMBER 1, 1974). Health and Safety Lab. (AEC), New York.

Available from NTIS, Dept. of Comm., Springfield, Va 22161 as Rept. No. HASL-286, \$10.60 in paper copy, \$2.25 in microfiche. Report No. HASL-286, Appendix, October 1974. 474 p, 4 fig, 5 tab. 7 ref.

Descriptors: *Fallout, *Data collections, *Strontium, Sites, *Monitoring, Radioisotopes, Lead, Air pollution, Milk, Potable water, *Path of pollutants.
Identifiers: Deposition, Conversion factors, Ele-

ments, Isotopes.

Data are reported from monthly monitoring sites in the United States and in other countries as follows: Sr 90 and Sr 89 in monthly deposition at World land sites; Radionuclides and lead in surface air; and Radiostrontium in milk and tap water. (See W75-06794 and W75-06805 thru W75-06807) (Houser-ORNL) W75-06804

STRONTIUM 90 AND STRONTIUM 89 IN MONTHLY DEPOSITION AT WORLD LAND

Health and Safety Lab. (AEC), New York. E. P. Hardy, Jr. In: Report No. HASL-286, Appendix, p a-2 - 334, October 1974. 2 fig, 1 tab.

*Fallout, Descriptors: *Monitoring, *Measurement, *Radioactivity, *Strontium, Data collections, Publications, Data processing, Data storage and retrieval, Radioisotopes, Sampling, Identifiers: Deposition.

At present, there are 34 monthly monitoring sites in the United States and 82 in other countries. The collections are made using either high-walled stainless steel pots with exposed areas of 0.076 square meters or plastic funnels with exposed areas of 0.072 square meters to which are attached ion-exchange columns. To facilitate the accurate storage, retrieval, and handling of the data generated from the monthly fallout collection network, all data have been transcribed to punched cards. The data printed out from the punched cards are presented in tables. Monthly Sr90 deposition values for New York City since 1954 are shown in graph form. (See also W75-06804) (Houser-ORNL)

RADIONUCLIDES IN LEAD AND SURFACE

AIR, Health and Safety Lab. (AEC), New York. H. L. Volchok, L. Toonkel, and M. Shonberg. In: Report No. HASL-286, Appendix, p B-1 - 131,

Descriptors: *Monitoring, Measurement, *Radioisotopes, *Sampling, Sites, *Fallout, Data collections, Analytical techniques, Radiochemical analysis, Gamma rays, Atlantic Ocean, Beryllium, Zirconium, Nuclear experiments, Cesium, Cerium, Manganese, Iron, Strontium, Cadmium, Plu-tonium, Lead, Quality control. Identifiers: Gross gamma, *China, *France

The primary objective of this program is to study the spatial and temporal distribution of nuclear weapons debris and lead in the surface air. Other special studies of surface air contamination have been added over the course of the program. Many of the original NRL sites, which grouped roughly along the 80th Meridian (West), have been continued in the current program. Since 1963 a number of other sites were added to investigate the possible effects of longitude, elevation and proximity to coastlines, and from late 1965 through March 1969, samplers were placed on four Atlantic Ocean weather ships to extend the surface air study over the marine environment. The present network extends from about 76 deg North to 90 deg South. A table lists the sampling stations along with their coordinates and elevations. (See also W75-06804) (Houser-ORNL)

RADIOSTRONTIUM IN MILK AND TAP WATER, Health and Safety Lab. (AEC), New York.

E. P. Hardy, Jr. In: Rept. No. HASL-286, Appendix, p C-1 - 7, October 1974. 2 fig, 3 tab.

Descriptors: *Fallout, *Radioactivity, *Strontium, *Cesium, *Monitoring, Measurement, *Milk, *Potable water, Food chains, Data collections, Publications, New York. Identifiers: *New York City(NY).

In 1954, the Health and Safety Laboratory began monitoring liquid whole milk in New York City for strontium-90 in order to estimate the dietary contribution from the ingestion of this radionuclide from this source. During the same year, tap water sampling was begun on a routine basis at the laboratory which receives its supply from one of the main reservoirs servicing New York City. Although a more complete study of the strontium-90 content of the diets in three major U.S. cities was started in March 1960, milk and tap water analyses in New York City have been continued in order to provide a detailed and continuous history of the contamination levels of these staples. Some additional data of Cesium 137 to Strontium 90 ratio are given. (See also W75-06804) (Houser-ORNL) W75-06807

HEALTH AND SAFETY LABORATORY FAL-LOUT PROGRAM QUARTERLY SUMMARY REPORT, (SEPTEMBER 1, 1974 THROUGH DECEMBER 1, 1974), Health and Safety Lab. (AEC), New York.

E. P. Hardy, Jr.

Available from NTIS, Springfield, Va. 22161 as Rept. No. HASL-288, \$7.60 in paper copy, \$2.25 in microfiche. Report No. HASL-288, January 1975. 172 p, 9 fig. 30 tab, 42 ref, 1 bib.

*Fallout, *Radioactivity, *Monitoring, Measurement, *Radioisotopes, *Assay, *Data collections, Data processing, Publications, Documentation, Sampling, Analysis, Analytical techniques, Strontium, Cesium, Plu-tonium, Lead, Diets, Milk, Air pollution, Water pollution, Potable water, Soil contamination, Food

Identifiers: Human bone.

This report presents current data from the Health and Safety Laboratory Program. The initial section consists of interpretive reports and notes on the regional uniformity of cumulative radionuclide fallout, analyses of quality control samples at HASL and a contractor laboratory in 1974, and quality control results for the HASL surface air amples in 1973. Subsequent sections include tabulations of radionuclide levels in fallout, surface air, stratospheric air, milk, diet, and tap water. A air, stratospheric air, misk, diet, and tap water. bibliography of recent publications related to radionuclide studies is also presented. Detailed data are tabulated in HASL-288-Appendix. (See W75-06819 thru W75-06826) (Houser-ORNL) W75-06818

REGIONAL UNIFORMITY OF CUMULATIVE RADIONUCLIDE FALLOUT,

Health and Safety Lab. (AEC), New York.

E. P. Hardy, Jr. In: Report No. HASL-288, p I-2 - 9, January 1975, 2 fig, 2 tab, 8 ref.

Descriptors: *Fallout, *Cesium, *Strontium, *Plutonium, *Radioisotopes, Surveys, Monitoring, Assay, *Nuclear explsions, Testing, Cities,

Bays, Sampling, Analysis, Soil contamination, Regional analysis, I Uniformity coefficient. Precipitation(Atmospheric),

Identifiers: *New york City, *San Francisco Bay.

Integrated deposits of Cs 137, Sr 90, and Pu 239, 240 from atmospheric nuclear testing were determined in the New York and San Francisco areas by analyzing soil samples collected at a number of sites. Higher fallout levels in New York reflected heavier mean annual precipitation but the variability within each area was less than 15 percent. (See also W75-06818) (Houser-ORNL) W75-06819

ANALYSES OF QUALITY CONTROL SAMPLES AT HASL AND A CONTRACTOR LABORATORY DURING 1974,
Health and Safety Lab. (AEC), New York.

E. P. Hardy, Jr.

In: Report No. HASL-288, p I-10 - 32, January 1975. 5 tab, 1 ref.

Descriptors: *Sampling, *Analysis, *Quality control, Laboratories, *Assay, *Fallout, Diets, Drinking water, Ion exchange, Resins, Calcium compounds, Phosphates, Cation exchange, Vegetation, Incineration. Identifiers: *Human bone, Ash

Samples of biological material and fallout, analyzed at HASL and by a contractor laboratory include quality control samples which are sub-mitted as blinds. These checks consist of blanks. reference samples analyzed repeatedly over a period of years, replicates or splits of unknowns, spikes, and duplicate samplings. Quality control data are summarized for ashed bone, diet, tap water, and fallout samples analyzed for 87 90, Cs 137, and Ca during 1974. (See also W75- 06818) (Houser-ORNL)

HASL SURFACE AIR SAMPLING PROGRAM -THE QUALITY OF ANALYSIS - 1973, Health and Safety Lab. (AEC), New York. L. Toonkel, M. Schonberg, and H. Volchok. In: Report No. HASL-288, p I-33 - 60, January 1975. 6 tab, 6 ref.

Descriptors: *Analytical techniques, Analysis, *Sampling, *Quality control, Evaluation, *Radioactivity, *Reliability, Variability, *Air pollution, Water pollution, Soil contamination, Strontium, Plutonium, Beryllium, Zirconium, Cesium, Cerium, Radioisotopes. Identifiers: Surface air.

In general the quality of the analyses in the Surface Air Sampling program in 1973 was satisfactory. The accuracy averaged within 15% and the mean precision was within plus or minus 15% in most cases. There was an inexplicable tendency toward a small negative bias for a number of the substances analyzed. (See also W75-06818) (Houser-ORNL)
W75-06821

PROJECT AIRSTREAM, Health and Safety Lab. (AEC), New York.
P. W. Krey, L. E. Toonkel, and M. Schonberg. In: Report No. HASL-288, p II-7 - 96, January 1975. 6 fig. 7 tab. 24 ref.

Descriptors: *Surveys, *Monitoring, *Radioactivity, Aircraft, *Air pollution, Sampling, Analysis, Radiochemical analysis, Data collections, Seasonal, Sulphur, Strontium, Lead, Polonium, Plutonium, Beryllium, *Remote sensing. Identifiers: *Lower stratosphere.

Project Airstream is HASL's study of radioactivity in the lower stratosphere employing the WB-57F aircraft as a sampling platform. This project is a continuation of the Defense Atomic Support

Sources Of Pollution—Group 5B

Agency's Project Stardust except that Airstream's sampling missions are limited to only one per season. Radiochemical data from the missions flown in January, June and November 1973 and in April 1974 are presented. (See also W75-06818) (Houser-ORNL) W75-06822

APPENDIX TO HEALTH AND SAFETY LABORATORY FALLOUT PROGRAM QUAR-TERLY SUMMARY REPORT, (SEPTEMBER 1, 1974 THROUGH DECEMBER 1, 1974), Health and Safety Lab. (AEC), New York

E.P. Hardy, Jr. Available from NTIS, Springfield, Va. 22161 as WASI, 288-Appendix. Report No. Rept. No. HASL-288-Appendix. Rept HASL-288-Appendix, January 1975. 474 p

Descriptors: *Fallout, *Radioactivity, *Data collections, *Sites, Sampling, Analysis, Publications, Public health, Laboratories, Strontium, Air pollution, Water pollution, Milk, Potable water

Data are reported from monthly monitoring sites in the United States and in other countries as follows: Sr 90 and Sr 89 in monthly deposition at World land sites; Radionuclides and lead in surface air, and Radiostrontium in milk and tap water. (Houser-ORNL) (See W75-06818 and W75-06826)

SR 90 AND SR 89 IN MONTHLY DEPOSITION

AT WORLD LAND SITES.
Health and Safety Lab. (AEC), New York.
In: Rept. No. HASL-288-Appendix, p A-1 - A-333, January 1975. 2 fig.

Descriptors: *Surveys, *Monitoring, Measurement, Assay, *Fallout, *Strontium, Sites, Data collections, Data processing, Publications, Sampling, Analysis, Public health, Laboratories, Precipitation(Atmospheric), Administration, Coordination.
Identifiers: *New York City.

At present, there are 34 monthly monitoring sites in the United States and 82 in other countries. The collections are made using either high-walled stainless steel pots which exposed areas of 0.076 square meters or plastic funnels with exposed areas of 0.072 square meters to which are attached ion-exchange columns. The data printed out from the punched cards are presented in tables. All ratios of Sr89 to Sr90 have been extrapolated to the midpoint of the sampling month. Calculated values of the concentration of Sr90 in precipitation are given in units of pCi of Sr90 per liter. The total precipitation in centimeters and the Sr90 deposition in millicuries per square kilometer for data available during a calendar year are listed. The groups or organizations responsible for the sam-pling are also identified on the individual site data sheets. Monthly Sr90 deposition values for New York City since 1954 are shown in graph form. (See also W75-06823) (Houser-ORNL)

RADIONUCLIDES AND LEAD IN SURFACE

AIR, Health and Safety Lab. (AEC), New York. In: Report No. HASL-288-Appendix, p B-1 - 131, January 1975. 1 tab, 7 ref.

Descriptors: *Monitoring, *Air pollution, *Fallout, *Oceans, *Sea breezes, Atlantic Ocean, Meteorology, Strontium, Lead, Radioisotopes, Water pollution, Sites, Sampling, Radiochemical analysis, Gamma rays, Public health.

The primary objective of this program is to study the spatial and temporal distribution of nuclear weapons debris and lead in the surface air. Other special studies of surface air contamination have been added over the course of the program. Many

of the original NRL sites, which grouped roughly along the 80th Meridian (West), have been continued in the current program. Since 1963 a number of other sites were added to investigate the possible effects of longitude, elevation and proximity to coastlines, and from late 1965 through March 1969, samplers were placed on four Atlantic Ocean weather ships to extend the surface air study over the marine environment. The resent network extends from about 76 degrees North to 90 degrees South. Table 2a lists the sampling stations along with their coordinates and elevations. (See also W75-06823) (Houser-ORNL) W75-06825

RADIOSTRONTIUM IN MILK AND TAP

Health and Safety Lab. (AEC), New York. In: Report No. HASL-288-Appendix, p C-1 - C-7, January 1975, 1 fig. 2 tab.

*Monitoring, *Kauro-*Radioactivity, Descriptors: *Measurement, *Strontium, *Drinking water, New York, Cities, Diets, Public health, Absorption, Food chains, Data collections, Data processing, Publications, Sampling, Analy-

Identifiers: *Ingestion, *New York City.

In 1954, the Health and Safety Laboratory began monitoring liquid whole milk in New York City for Strontium 90 in order to estimate the dietary contribution from the ingestion of this radionuclide from this source. During the same year, tap water sampling was begun on a routine basis at the laboratory which receives its supply from one of the main reservoirs servicing New York City. Although a more complete study of the Strontium 90 content of the diets in three major U.S. cities was started in March 1960, milk and tap water analyses in New York City have been continued in er to provide a detailed and continuous history of the contamination levels of these staples. (See also W75-06823) (Houser-ORNL) W75-06826

SYSTEM FOR DETECTING PARTICULATE MATTER.

Princeton Electronic Products, Inc., North Brun-swick, N.J. (assignee). S. R. Hofstein.

U.S. Patent 3,830,969. Issued August 20, 1974. Official Gazette of the United States Patent Office, Vol 925, No 3, p 1000, August, 1974. 1 fig.

Descriptors: *Patents, *Waste identification, Liquids, Analyzers, Sampling, Matter, Particles, *Pollutant identification.

Identifiers: *Particulate matter, *Television

A system and method for detecting and graphically visualizing particulate matter present in a fluid sample were described. The liquid sample is held in a transparent container and agitated by spinning the container for a limited time period. This places the particles in transient motion relative to the then stationary container. A television camera forms a time continuous image of the illuminated container and scattered points of light from the moving particles. This television image is processed by a signal converter tube. The processed image, now retaining only the light points corresponding to the moving particles, can be displayed on CRT equipment. The processed image signal may also be furnished to an electronic particle detector and analyzer, which will examine the particulate matter for characteristics such as movement, distribution, dimensions, and number or concentration. (Prague-FIRL) W75-06833

HYDROBACTERIOLOGICAL INVESTIGA-TIONS IN LAKE CONSTANCE: III. PROGRES-SIVE GROWTH OF PLANKTON-DEPENDENT

PRODUCTION OF BACTERIA AS AN INDICA-TION OF EUTROPHICATION, (IN GERMAN), Staatliches Institut fuer Seenforschung und Seenbewirtschaftung, Langenargen (West Germany). For primary bibliographic entry see Field 5C. W75-06839

POROUS CERAMIC SOIL MOISTURE SAM-PLERS, AN APPLICATION IN LYSIMETER STUDIES ON EFFLUENT SPRAY IRRIGATION. Department of Agriculture, Lethbridge (Alberta). Research Station. For primary bibliographic entry see Field 2G. W75-06843

5B. Sources Of Pollution

SUBSURFACE WASTE DISPOSAL BY INJEC-TION IN HAWAII: A CONCEPTUAL FORMU-LATION AND PHYSICAL MODELING PLAN, Water Hawaii Univ., Honolulu. Resources Research Center.

F. L. Peterson, and L. S. Lau.

Available from the National Technical Informa-tion Service, Springfield, Va 22161 as PB-240 982, \$3.25 in paper copy, \$2.25 in microfiche. Technical Memorandum Report No 41, November 1974. 14 p, 4 fig, 4 ref. OWRT B-038-HI(1). 14-31-0001-5068.

Descriptors: *Hawaii, *Model studies, *Path of pollutants, *Waste water disposal, Aquifers, *Groundwater movement, *Injection wells, Hydraulics, Hydrogeology, Water pollution

Identifiers: Hawaiian groundwater system, Density-stratified fluids, *Hele-Shaw models, *Sandbox models, Injection hydrodynamics.

Emphasis on water pollution control and stringent regulations on waste water disposal into surface and coastal waters has focused attention on subsurface disposal as an alternative in Hawaii. The need exists to ascertain the mechanics of injection well systems and the fate and effects of the injected fluid in the aquifer. A laboratory study was begun to examine the hydromechanics of waste injection into Hawaiian density stratified groundwater systems using both a sandbox model and a vertical Hele-Shaw model. The sandbox model is constructed to allow use of a variety of aquifer fluids, movement of dyed injection fluids will be followed by visual observation, liquid sampling, and photography. W75-06351

CONTRIBUTIONS OF TIDAL WETLANDS TO ESTUARINE FOOD CHAINS,

Maryland Univ., Prince Frederick. Center for Environmental and Estuarine Studies.

For primary bibliographic entry see Field 5C. W75-06353

STOCHASTIC VARIATIONS IN WATER QUALITY PARAMETERS, Rutgers - the State Univ., New Brunswick, N. J.

Bureau of Engineering Research. R. C. Ahlert.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 980, \$3.25 in paper copy, \$2.25 in microfiche. Water Resources Research Institute, New Brunswick, Rutgers University, February 1975. 6 p, 13 ref. OWRT A-035-NJ(3). 14-31-0001-4030.

Descriptors: *Simulation analysis, *Mathematical *Statistical models, *Stochastic models, *Statistical models, *Stochastic processes, Water quality, Temperature, Dissolved oxygen, Biochemical oxygen demand, Oxygen demand, Ammonia, Reservoir operation, *Model studies, New Jersey, Optimization, Discharge(Water), Organic loading.

Group 5B-Sources Of Pollution

Identifiers: Passaic River Basin(NJ), Passaic Valley Water Commission, Combined deterministicstochastic models, Quality prediction, Pollutant

A combined form of deterministic-stochastic modeling has been applied to the simulation of water quality parameters. The objective was to identify an optimum means of dynamic simulation for the purpose of water quality prediction and management. Consistent with earlier experience, discharge records for watersheds of various sizes (Passaic River Basin) are easily modeled. Temperature is modeled extremely well, also. Simulations of BOD (carbonaceous), dissolved oxygen, oxygen deficit and ammonia-N concentrations were relatively poor. A simple linear correlation between annual BOD loading (carbonaceous) and annual rainfall was observed. This led to successful deterministic-stochastic models of BOD (carbonaceous) loading. Ammonia-N loading models were not as successful, however, primarily because of significant gaps in reported data and the necessity of employing weekly averages as the basis of analysis. W75-06355

AN INVENTORY AND SENSITIVITY ANALY-SIS OF DATA REQUIREMENTS FOR AN OX-YGEN MANAGEMENT MODEL OF THE CAR-SON RIVER.

Nevada Univ., Reno. Dept. of Civil Engineering.

R. G. Orcutt, and J. G. Gonzales.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 099, \$3.75 in paper copy, \$2.25 in microfiche. Nevada University Desert Research Institute, Reno, 33.73 in paper copy,
University Desert Research Institute, Reno,
Center for Water Resources Research, Cooperative Report Series Publication No EN-1, September 1972. 33 p, 16 fig. 1 tab, 36 ref, 4 append.
OWRT A-044-NEV(1).

Descriptors: *Oxygen demand, *Computer models, Model studies, Water management(Applied), Water quality control, *Nevada, Evaluation, *Waste assimilative capacity, Biodegradation, Rivers, *Low-flow augmentation, Organic loading, Dissolved oxygen, Sewage, Path of pollutants.

Identifiers: *Carson River(Nev), Oxygen management models, *Sensitivity analysis.

An assessment of the need for developing more specific data on the capacity of the Carson River to assimilate biodegradable wastes is given. In order to provide this assessment, the effects of different degrees of low flow augmentation and residual waste loads on the oxygen levels of the River were estimated. Results indicate that the oxygen levels in the Carson River would be most sen-sitive to dissolved oxygen levels of entering waste water and to the dilution effect of low flow augmentation. Computed oxygen levels are less sensitive to assumed benthal deposits and increased sewage loading and relatively insensitive to the organic concentrations of entering wastes and to reasonable variations of the physical features of the low flow model chosen to simulate the Carson River. W75-06356

ESTUARINE POLLUTION IN THE STATE OF HAWAII, VOLUME 2: KANEOHE BAY STUDY, Hawaii Univ., Honolulu. Water Resources Research Center

D. C. Cox, P. R. Fan, K. E. Chave, R. I. Clutter, and K. R. Gundersen.
Technical Report No 31, November 1973. 444 p, 75

fig, 78 tab, append.

Descriptors: Hydrogeology, *Hawaii, *Estuaries, *Path of pollutants, Oceanography, Ecology, Biota, Water quality, Phosphorus, Recreation, Sedimentation, Microbiology, Nitrogen, Sewage disposal, Economics, Rainfall, Wind velocity, Coliforms, Water temperature, Plankton, Organic waster Legopore wastes, Lagoons,

Identifiers: *Kancohe Bay(HI).

Kaneohe Bay, a combination coastal-plain estuary and lagoon, is used extensively for recreation and as a fishery. Fresh water discharges to the bay, principally from perennial streams, originally totaled about 97 mgd, but have been reduced by diversions by about 38 percent. Only 8 percent of the exchange transport with ocean water affects the southeastern part of the bay, which comprises 27 percent of the bay volume. Into this southeastern part of the bay is discharged nearly 3 mgd of sewage effluents, mostly after secondary treatment. During floods, both perennial and intermittent streams discharge large amounts of sediments, one stream discharging an estimated 9470 tons in a single 24-hour storm period. High concentrations of total coliforms and fecal coliforms occurred in the stream mouths and in the vicinity of sewer outfalls; however, most of the bay water met the state standards for the highest water quality class. Nitrogen concentrations offshore, in streams, and the bay were found generally to exceed standards, indicating unreasonably restric-tive standards. Phosphorus concentrations in streams and at outfalls exceeded standards but decreased rapidly away from points of discharge. Plankton studies indicated a high productivity in the south decreasing to lower productivity to the north. Trends toward eutrophication, decreasing diversity, and stability have been documented. Among alternatives for reducing the pollution of the bay by sewage effluents, the diversion of the effluents by force main to the open ocean east of Kaneohe Bay was found to be the most economi-W75-06362

A WATER QUALITY MODEL TO EVALUATE WATER MANAGEMENT PRACTICES IN AN IRRIGATED STREAM-AQUIFER SYSTEM, Geological Survey, Denver, Colo. For primary bibliographic entry see Field 5G.

A CRITICAL APPRAISAL OF THE WATER POLLUTION PROBLEM IN INDIA IN RELATION TO AQUACULTURE,
Central Inland Fisheries Research Inst., Bar-

rackpore (India). V. G. Jhingran. In: Indo-Pacific Fisheries Council Proceedings,

15th Session, Wellington, New Zealand. Oct. 18-27, 1972. Section II, Coastal Aquaculture and Environment. Bangkok, 1974, p 45-50. 2 tab, 16 ref.

Descriptors: *Water pollution sources, *Sewage effluents, *Aquiculture, Industrial wastes, Biochemical oxygen demands, Estuaries, Freshwater, Fertilizers, Waste water treatment, Pesticides, Activated sludge, DDT, Herbicides. Identifiers: *India

The major sites of freshwater pollution in India lie along the important river systems. Estuaries, in general, are not yet severely affected, although there is evidence of adverse effects of organic and industrial effluents in certain areas. There is no significant marine pollution as yet but the rapid development of industrial programs poses a threat for the future. Pollutants that threaten aquaculture are listed and discussed. Little information is available on the toxicity of various pesticides to endemic fish species and additional research is required before control measures can be formulated. (Katz) W75-06378

THE CHEMICAL TOXICITY OF ELEMENTS. Battelle-Pacific Northwest Labs., Richland, Wash. Water and Land Resources Dept. For primary bibliographic entry see Field 5C. DIFFUSION OF RADIOACTIVE FLUID THROUGH SOIL SURROUNDING A LARGE POWER-REACTOR STATION AFTER A CORE MELTDOWN ACCIDENT, California Univ., Livermore. Lawrence Liver-

more Lab J. H. Pitts, B. R. Bowman, R. W. Martin, and J. P.

McKay.

Available from the National Technical Information Service, Springfield, Va 22161 as Rept. No. UCRL-51494, \$4.00 in paper copy, \$2.25 in microfiche. Report No. UCRL-51494, December 1973. 24 p, 15 fig, 7 ref.

Descriptors: *Path of pollutants, *Nuclear powerplants, *Accidents, *Hazards analysis, *Radioactivity, *Diffusion, *Soil contamination, Liquids, Gases, Model studies, Clays, Assessment, Sands, Flow, Flow rates, Heat transfer, Cooling, Heating, Melting. Identifiers: Core meltdown

The flow of fluids through the soil surrounding a large power-reactor station after a core meltdo accident was analyzed. Fracture of, or penetration through, a portion of the containment floor was assumed so that radioactive gases would be driven through the soil by pressure within the contain-ment shell. Results for both one-dimensional ideal gas and multiphase flow were obtained using dimensionless variables so that results are applicable for all soil conditions. Two-dimensional results are included for a specific case where permeability of the soil varies spatially. These calculations show that the time required for radioactive gases to permeate to the ground surface are years for silty-type clays and about 10 h for sand-type soil. Heat transfer calculations that estimate the amount of steam generated should the core melt penetrate the containment floor and contact wet soil show that cooling systems must be in opera-tion within four or five days in order to prevent overpressurization of the containment shell. (Houser-ORNL) W75-06407

CESIUM-137 FALLOUT IN RED DESERT BASIN OF WYOMING, USA, Dow Chemical Co., Golden, Colo. Rocky Flats

For primary bibliographic entry see Field 5A.

ENVIRONMENTAL RADIOACTIVITY AT THE NATIONAL NUCLEAR RESEARCH CENTRE, PELINDABA.

Atomic Energy Board, Pelindaba, Pretoria (South Africa). Isotopes and Radiation Div. For primary bibliographic entry see Field 5A. W75-06410

AND **ECONOMIC** ENVIRONMENTAL. EVALUATION OF NUCLEAR WASTE DISPOSAL BY UNDERGROUND IN SITU MELTING. Univ., Livermore. Lawrence Liver-California

more Lab. J. J. Cohen, R. L. Braun, L. L. Schwartz, and H.

A. 12wes. Available from NTIS, Springfield, Va 22161 as Rept. No. UCRL-51713, \$4.00 in paper copy, \$2.25 in microfiche. Report No. UCRL-51713, November 1974. 17 p, 6 fig, 2 tab, 19 ref, append.

Descriptors: *Radioactive waste disposal, waste disposal, posal, *Heating, *Melting, Evaluation, Management, Reviews, Environmental effects, Economics, Geological formations. Comparative benefits, Comparative costs, Public health.

Disposal of high-level nuclear waste by the Deep Underground Melt Process (DUMP) is reviewed and evaluated relative to other proposed methods for waste management. Although the potential en-

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vironmental impact (population exposure to radiation) for the DUMP concept was found to be lower than that for alternative disposal methods, the difference is of small significance. The economic advantages, however, were substantial. A potential 80% cost savings relative to other geologic disposal methods is indicated. (Houser-ORNL) W75-06413

TRANSURANICS AT PACIFIC ATOLLS I. CON-CENTRATIONS IN THE WATERS AT ENEWETAK AND BIKINI,

California Univ., Livermore. Lawrence Livermore Lab. For primary bibliographic entry see Field 5A. W75-06414

SOURCES OF POTENTIAL BIOLOGICAL DAMAGE FROM ONCE-THROUGH COOLING SYSTEMS OF NUCLEAR POWER PLANTS, Oak Pides National Lab Tanan

Oak Ridge National Lab., Tenn. C. P. Goodyear, C. C. Coutant, and J. R. Trabalka. Available from NTIS, Springfield, Va 22161 as Rept. No. ORNL-TM-4180, \$5.50 in paper copy, \$2.25 in microfiche. Report No. ORNL-TM-4180, July 1974. 48 p, 6 fig, 98 ref.

Descriptors: *Nuclear powerplants, Effluents, Environmental effects, Sites, Ecosystems, Biological communities, Ecology, *Temperature, *Cooling water, Water pollution sources, Assessment, Toxicity, Radiation, Dissolved oxygen. Identifiers: Biocides.

A general introduction is presented to pertinent biological and ecological information related to predicting the environmental effects of operating a nuclear power plant equipped with once-through, open circuit cooling of steam turbine condensers. Information of this nature forms the basis (along with detailed, site-specific data) for assessments of ecological impacts of nuclear power plants. Assessments include temperature changes, mechanical and pressure changes, impingement on intake screens, chemical toxicity of biocides, changes in dissolved oxygen, induced circulation, radiation, and combinations of all of these. Other sources of damage may arise at particular power plant sites. All of these need to be carefully considered and their effects predicted when making power plant environmental impact assessments. (Houser-ORNIL)

DRAFT ENVIRONMENTAL STATEMENT HTGR FUEL REFABRICATION PILOT PLANT AT THE OAK RIDGE NATIONAL LABORATO-DV

RY. Oak Ridge National Lab., Tenn. Available from NTIS, Springfield, Va 22161 as Rept. No. WASH-1533, \$11.00 in paper copy, \$2.25 in microfiche. Report No. WASH-1533, January 1974. 161 p, 25 fig, 16 tab, 28 ref, 5 append.

Descriptors:

*Temperature,

*Coolants,

*Construction,

*Environmental effects,

*Uranium,

Thorium,

Design, Design criteria, Operations, Research and

development, Pilot plants, Technology.

Identifiers: Chemical processing plant,

*Thorium fuel cycle,

*Environmental impact statements.

A proposed project to demonstrate the technology for refabrication of uranium-233 for use in high temperature gas-cooled reactors (HTGR) operating on the thorium fuel cycle. The proposed project, with a projected cost of \$10 million, includes the design, construction, and operation of an integrated pilot plant to develop and demonstrate the HTGR fuel fabrication technology. This project is coordinated with the HTGR fuel reprocessing pilot plant that is planned for installation in the Idaho Chemical Processing Plant (ICPP) at the National Reactor Testing Station (NRTS) in Idaho Falls,

Idaho. These projects complement each other in the development of HTGR fuel recycle technology. (Houser-ORNL) W75-06417

BIOLOGICAL DOSE AND RADIOLOGICAL ACTIVITY FROM NUCLEAR REACTOR OR NUCLEAR WEAPON FISSION PRODUCTS, Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A. W75.06419.

HEALTH AND SAFETY LABORATORY FAL-LOUT PROGRAM QUARTERLY SUMMARY REPORT, MARCH 1, 1974 THROUGH JUNE 1, 1974.

Health and Safety Lab. (AEC), New York. For primary bibliographic entry see Field 5A. W75-06420

RADIOACTIVITY FROM NUCLEAR WEAPONS IN AIR AND PRECIPITATION IN SWEDEN FROM MID-YEAR 1968 TO MID-YEAR 1972, Research Inst. of National Defence, Stockholm (Sweden). For primary bibliographic entry see Field 5A. W75-06421

STRONTIUM-90 IN THE DIET. RESULTS THROUGH 1973, Health and Safety Lab. (AEC), New York.

Health and Safety Lab. (AEC), New York. For primary bibliographic entry see Field 5A. W75-06422

SURFACE DEPOSITION IN THE UNITED STATES,

National Oceanographic and Atmospheric Administration, Silver Spring, Md. Air Resources Labs.

For primary bibliographic entry see Field 5A.

For primary bibliographic entry see Field 5A. W75-06423

CARBON-14 MEASUREMENTS IN THE STRATOSPHERE FROM A BALLOON-BORNE MOLECULAR SIEVE SAMPLER (1971-1973), Argonne National Lab., Ill. For primary bibliographic entry see Field 5A. W75-06425.

ENVIRONMENTAL RADIATION MEASURE-MENTS IN THE VICINITY OF A BOILING WATER REACTOR: HASL DATA SUMMARY, Health and Safety Lab. (AEC), New York. For primary bibliographic entry see Field 5A. W75-06425

PROJECT AIRSTREAM, Health and Safety Lab. (AEC), New York. For primary bibliographic entry see Field 5A. W75-06426

CESIUM-137 IN VARIOUS CHICAGO FOODS (COLLECTION MONTH APRIL 1974), Argonne National Lab., Ill. For primary bibliographic entry see Field 5A. W75-06427

EFFECT OF APPLICATION RATE, INITIAL SOIL WETNESS, AND REDISTRIBUTION TIME ON SALT DISPLACEMENT BY WATER, Punjab Agricultural Univ., Ludhiana (India). Dept. of Soils. For primary bibliographic entry see Field 2G.

PICKLING LIQUORS, STRIP MINES, AND GROUND-WATER POLLUTION, Ohio State Univ., Columbus. Dept. of Geology and Mineralogy. W. A. Pettyjoh. Ground Water, Vol 13, No 1, p 4-10, January-Ground Water, Vol 13, No 1, p 4-10, January-

Ground Water, Vol 13, No 1, p 4-10, Ja February 1975. 3 fig, 5 tab.

Descriptors: *Path of pollutants, *Water pollution sources, *Strip mines, *Liquid wastes, Industrial wastes, Acidic water, Spoil banks, Pollutant identification, Groundwater, Surface waters, *Ohio, Waste disposal, Hydrogeology, Geochemistry, On-site data collections.

Identifiers: Pickling liquors.

In 1964 a waste disposal firm began dumping neutralized spent pickling liquors into an abandoned strip mine in eastern Ohio. In 1970 the disposal pit was enlarged and shortly thereafter significant water pollution problems began to occur. Highly mineralized fluids began to leak from the disposal pit into the surrounding spoil material and eventually into streams and ponds. These solutions are characterized by a low pH and excessive concentrations of dissolved solids, hardness, sulfate, chloride, nitrate, iron, fluoride, aluminum, chromium, nickel, and zinc. In addition to the contamination by steel mill wastes, acid-mine drainage from surrounding areas degrades both ground and surface water. Acid-mine drainage is characterized by a low pH, and high concentrations of dissolved solids, hardness, sulfate, and iron. Geohydrologic and geochemical data clearly illustrate that abandoned strip mines should not be used for the storage of toxic liquid or semiliquid materials. (Gibb-ISWS) W75-06450

EFFLUENT FOR IRRIGATION - A NEED FOR CAUTION,

Illinois State Water Survey, Urbana. For primary bibliographic entry see Field 5D. W75-06451

NATURAL SOIL NITRATE: THE CAUSE OF THE NITRATE CONTAMINATION OF GROUND WATER IN RUNNELS COUNTY, TEXAS,

Texas Univ., Austin. Bureau of Economic Geolo-

C. W. Kreitler, and D. C. Jones. Ground Water, Vol 13, No 1, p 53-61, January-February 1975. 11 fig, 1 tab, 13 ref.

Descriptors: *Groundwater, *Water pollution sources, *Nitrates, *Soil surveys, *Water quality, Subsurface waters, Pollutants, Soil water, Leaching, Animal wastes(Wildlife), Cattle, Feed lots, Soil tests, Isotope studies, Water pollution, Spectrometers, *Texas, Nitrogen, Fertilizers. Identifiers: Natural soil nitrate, *Anoxia, Runnels County(Tex).

The groundwaters of Runnels County, Texas, are highly contaminated with nitrate. The average nitrate concentration of 230 water samples was 250 mg.1 NO3. The natural variations of the stable nitrogen isotopes N14 and N15 identified natural soil nitrate as the predominant source. Nitrate from animal wastes was of minor importance. The delta N15 range of natural soil nitrate was +2 to +8 parts per thousand, whereas the delta N15 range of animal waste nitrate was +10 to +20 parts per thousand. (Atmospheric nitrogen was used as a standard for mass spectrometric analysis. Experimental error for sample preparation and isotopic analysis was + or -1 part per thousand.) More than 66% of the groundwater nitrates analyzed were in the delta N15 range of natural soil nitrates. Dryland farming since 1900 caused the oxidation of the organic nitrogen in the soil to nitrate. Minimal fertilizer has been used because of the lack of suitable water for irrigation. During the period 1900-1950, nitrate was leached below the root zone but not to the water table. Extensive terracing

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after the drought in the early 1950's raised the water table approximately 6 meters and leached the nitrate into the groundwater. Tritium dates indicate that the groundwater is less than 20 years old. (Prickett-ISWS) W75-06452

GREAT LAKES WATER QUALITY, ANNUAL REPORT TO THE INTERNATIONAL JOINT COMMISSION, (1973).

International Joint Commission-United States and Canada. Great Lakes Water Quality Board. Available from the National Technical Information Service, Springfield, Va 22161 as PB-233 188, \$9.25 in paper copy, \$2.25 in microfiche. April 1973. 315 p, 36 fig, 12 tab.

Descriptors: *Great Lakes, *Water quality, Water pollution sources, Pollutants, Lakes, Limnology, Thermal pollution, Water pollution, Eutrophication, Ships, Rivers, Legal aspects, Water law, Water policy, Canada, United States, Federal government, State governments.

A current assessment of water quality in the boundary waters of the Great Lakes and of the control program involved in the improvement of water quality was presented. (Sims-ISWS) W75-06474

LAND TREATMENT OF MENHADEN WASTE WATER BY OVERLAND FLOW,

Louisiana State Univ., Baton Rouge. Dept. of Marine Science. For primary bibliographic entry see Field 5D. W75-06526

SEA SALT PARTICLES TRANSPORTED TO THE LAND,

Hokkaido Univ., Sapporo (Japan). Dept. of Chemistry. S. Tsunogai.

Tellus, Vol 27, No 1, p 51-58, 1975. 4 fig, 5 tab, 13 ref.

Descriptors: "Salts, "Monsoons, "Typhoons, Saline water, Coasts, Pacific coast region, "Chlorides, Rivers, Sea water, Sedimentation, Precipitation(Atmospheric), Soil contamination, Fallout, Sediment transport, Path of pollutants. Identifiers: Salt transport, Salt particle intrusion, "Japan, "Chloride deposition(Rains).

Large quantities of sea salt particles are suddently transported to the land by the discrete events of a violent storm. In Japan these events are the typhoon in summer on the Pacific coast region and the north-west monsoon in winter on the Japan Sea coastal region. The share of sedimentation, one of the mechanisms of the transport of sea salt particles to the land, is only about 20% of precipitation over various parts of Japan. The contribution of impaction with surface obstacles is negligibly small, as observed in the example of the Ogochi Basin. This conclusion was also confirmed by analyzing the concentration of chloride in rivers undisturbed by other sources. Moreover, the analysis revealed the following facts. The halfdecrease distance of the concentration is about 20 km from the coast in both coastal regions in Japan. The total deposition of sea salt was calculated to be 2,700,000 metric tons per year in the whole of Japan (area 370,000 square kilometers) and the mean concentration of chloride in rain to be 2.4 ppm over Japan as a whole, but the concentration is about 3 times larger over the Japan Sea coastal region than over the Pacific coast region, owing to the violent north-west monsoon in winter. (Lee-ISWS)

HEAVY METALS IN CULTIVATED OYSTERS (CRASSOSTREA COMMERCIALIS = SACCOS-

TREA CUCULLATA) FROM THE ESTUARIES OF NEW SOUTH WALES (AUSTRALIA), Chief Secretary's Dept., Sydney (Australia). New

South Wales Fisheries Branch. N. J. Mackay, R. J. Williams, J. L. Kacprzac, M.

N. Kazacos, and A. J. Collins. Australian Journal of Marine and Freshwater Research, Vol 26, No 1, p 31-46, March 1975. 9 fig, 5 tab, 17 ref.

Descriptors: *Heavy metals, *Oysters, *Australia, *Estuaries, *Path of pollutants, Water pollution effects, Sampling, Monitoring, Variability, Zinc, Cadmium, Copper, Arsenic compounds, Mollusks, Lead, Aging(Biological).

Identifiers: *New South Wales(Australia), Cras-

sostrea commercialis, Georges River(NSW).

Results are reported of a survey of copper, zinc, cadmium, lead and arsenic levels in the Sydney rock oyster from 19 estuaries along the coast of New South Wales. Metal concentrations were generally low, and represented little or no health risk to consumers. Evidence indicates that metal levels decrease with increasing age and wet weight of the oysters. In one estuary (Georges River) a gradient of increasing metal concentration in oysters with increasing distance upstream from the sea was found, which may suggest an effect of pollution, through this needs verification. The variability of metal concentrations is discussed in relation to a suggested sampling method for future monitoring of metal levels in this species. (Levick-CSIRO)

STEADY-STATE WATER QUALITY MODEL-ING IN STREAMS

ING IN STREAMS, Cornell Univ., Ithaca, N.Y. School of Civil and Environmental Engineering. R. Willis, D. R. Anderson, and J. A. Dracup.

Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol 101, No EE2, Proceedings paper No 11246, p 245-258, April 1975.

Descriptors: *Environmental engineering, *Rivers, *Dissolved oxygen, *Simulation analysis, *Water quality, *Mathematical models, Management, Water distribution(Applied), Streams, Advection, Dissolved oxygen, Biochemical oxygen demand, California, Nevada, Planning, Systems analysis, *Path of pollutants.

Identifiers: Mass transport, Input data.

A general mathematical model for simulation of conservative and nonconservative constituents in streams and rivers is developed. Mass transport of constituents is accomplished by advection and biochemical reactions. The models simulate the interaction of the dissolved-oxygen resources of the water system with the nitrogen cycle, chlorophyll a, and carbonaceous biochemical oxygen demand. Also, conservative substances and phosphorous uptake by algae and coliforms are simulated by the model. The results of applying the model to the Truckee River system in northern California and Nevada are presented. The system's reservoirs, natural streams, sewage treatment plants, and ir rigation diversions are described. The model demonstrates the ability to simulate historical water quality conditions and to be a flexible, easily adaptable planning tool. Planners can assess the impact of alternate water quality control measures on the river system by varying treatment levels at each discharge point and the quality and quantity conditions at each headwater in the system. Also, the model can estimate the volume of dilution water required to meet dissolved oxygen target levels in the system. The validity of any simula tion, however, rests on the quality of the input data. (Bell-Cornell) W75-06564

NUMERICAL MODELING OF THERMAL STRATIFICATION IN A RESERVOIR WITH LARGE DISCHARGE-TO-VOLUME RATIO, Tennessee Valley Authority, Muscle Shoals, Ala. Air Quality Branch. For primary bibliographic entry see Field 2H. W75-06572

GROUNDWATER POLLUTION: CASE LAW THEORIES FOR RELIEF,

Missouri Univ., Columbia. P. N. Davis.

Missouri Law Review, Vol 39, No 2, p 117-163, Spring 1974. 3 tab, 164 ref, 3 append.

Descriptors: *Groundwater resources, *Water pollution, *Judicial decisions, *Legal aspects, Groundwater movement, Groundwater availability, Groundwater, Water supply, Industrial wastes, Water pollution sources, Water resources development, Water management(Applied), Negligence, Risks, Water law. Identifiers: Nuisance.

One-quarter of the earth's supply of fresh water lies underground. Traditionally, shallow wells have tapped this underground resource for domestic and livestock watering purposes. With the increase in industrial technology the uses of groundwater have multiplied and total withdrawals from wells have increased. This increased tapping of the supply has caused both shortages and pollution problems. Courts in many states have been faced with the resolution of these problems. In the majority of cases dealing with pollution of percolating groundwater courts employ the law of negligence theory, a groundwater user is liable for his pollution if he knew or should have known of the injury which occurred. Nuisance law on the other hand does not look toward the comparative reasonableness of a person's conduct, but addresses itself to the nature of the injurious consequences. Two states use the restatement of torts rule concerning interferences with the use of land, and eleven jurisdictions have imposed strict liability for certain types of percolating groundwater pollution. Eastern states tend to recognize the hydrologic relationship between surface water-courses and groundwater and grant relief for the pollution of one by an activity affecting the other. (Proctor-Florida)

WATER REGULATIONS--OIL POLLUTION PREVENTION.

For primary bibliographic entry see Field 5G. W75-06600

POINT SOURCES COVERED BY NPDES AND PROCEDURES. For primary bibliographic entry see Field 5G. W75-06617

EFFLUENT GUIDELINES ARE ON THE WAY, For primary bibliographic entry see Field 5G. W75-06619

ECOLOGICAL EFFECTS OF NUCLEAR STEAM ELECTRIC STATION OPERATIONS ON ESTUARINE SYSTEMS.

Maryland Univ., Prince Frederick. Center for Environmental and Estuarine Research. For primary bibliographic entry see Field 5C. W75-06621

ANALYSIS OF CALVERT CLIFFS REFERENCE STATION MEASUREMENTS (TEMPERATURE, SALINITY, AND DISSOLVED OXYGEN), Martin Marietta Labs., Baltimore, Md. H. Obremski. In: Report No. ORO-4328-3, pIII-1 - III-37, June 1974, 8 fig. 7 tab, 4 ref.

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Descriptors: *Maryland, *Temperature, *Salinity, *Dissolved oxygen, Profiles, Sites, Nuclear power plants, Surveys, Monitoring, Environment, Measurement, *Chesapeake Bay, Aquatic environment, Water pollution, Thermal pollution, Standards, Data collections, Seasonal. Identifiers: *Calvert Cliffs Site(Md).

Permit requirements for new power plants call for pre-operational field studies to determine environmental baselines from which to evaluate post-operational environmental changes. This presently is being attempted by characterizing the physical, chemical, and biological conditions at a site through intensive field sampling before and during plant construction and after plant operation begins. This approach, however, does not provide a clearcut comparison of pre- and post-operational environmental conditions. Physical, chemical, and biological parameters at a site can fluctuate significantly from one year to another making it difficult to attribute observed environmental changes unambiguously to the addition of a power plant. To eliminate this ambiguity, the Reference Station Method, a statistical technique for comparing pread post-operational environmental conditions at a power plant site, was developed. This method is being field tested for temperature, salinity, and dissolved oxygen measurements at the Baltimore Gas and Electric Company's Calvert Cliffs nuclear power plant on the Chesapeake Bay. (See also W75-06621) (Houser-ORNL)

RADIOCHEMISTRY-GAMMA ANALYSIS: CALVERT CLIFFS SEDIMENT RADIOACTIVI-TIES BEFORE AND AFTER TROPICAL STORM AGNES.

AGNES, National Aeronautics and Space Administration, Washington, D.C. Planatology Branch.

P. J. Cressy, Jr. In: Report No. ORO-4328-3, p IV-1 - IV-11, June 1974, 6 fig.

Descriptors: *Maryland, Nuclear power plants, Effluents, *Chesapeake Bay, *Monitoring, Measurement, *Assay, *Radioactivity, Sediments, Tropical cyclones, Storms, Environmental effect, Aquatic environment, Distribution, Analytical techniques, Radiochemistry.

Identifiers: *Calvert Cliffs Site(Md), *Tropical

storm Agnes.

A preliminary report is presented of a cooperative study of surface sediments near the Calvert Cliffs Nuclear Power Plant Site. The general purpose of this investigation is to establish base levels and correlations of natural and man-made, gammar-supermitting radionuclides prior to operation of the power plant. The first sets of samples examined under this program were acquired some six weeks before and six weeks after Tropical Storm Agnes. Measured radioactivities in these samples were analyzed to determine what effect, if any, Agnes had on radionuclide and sediment distributions. The effect of Agnes on radionuclide distribution was relatively small. (See also W75-06621) (Houser-ORNL)

PHYTOPLANKTON: CONTINUING STUDIES ON PRIMARY PRODUCTIVITY AND STAND ING CROP OF PHYTOPLANKTON AT CAL-VERT CLIFFS, CHESAPEAKE BAY, MARVIAND LINE, PRIME FREDERICK CONTEST OF FROM

Maryland Univ., Prince Frederick. Center for Environmental and Estuarine Research. For primary bibliographic entry see Field 5C. W75-06624

ZOOPLANKTON: PROGRESS REPORT TO THE U.S. ATOMIC ENERGY COMMISSION ZOOPLANKTON STUDIES AT CALVERT CLIFFS.

Maryland Univ., Prince Frederick. Natural Resources Inst. For primary bibliographic entry see Field 5C. W75-06625

EFFECT OF TROPICAL STORM AGNES ON STANDING CROPS AND AGE STRUCTURE OF ZOOPLANKTON IN MIDDLE CHESAPEAKE RAY.

BAY, Maryland Univ., Prince Frederick. Natural Resources Inst. For primary bibliographic entry see Field 5C.

MEROPLANKTON,

Maryland Univ., Prince Frederick. Center for Environmental and Estuarine Studies. For primary bibliographic entry see Field 5C. W75-06627

BENTHIC ANIMAL-SEDIMENT, Maryland Univ., Prince Frederick. Center for Environmental and Estuarine Studies. For primary bibliographic entry see Field 5C. W75-06628

BENTHIC-HEAVY METALS, Federal City Coll., Washington, D.C. For primary bibliographic entry see Field 5C. W75-06629

STORM RUNOFF AND TRANSPORT OF RADIONUCLIDES IN DP CANYON, LOS ALAMOS COUNTY, NEW MEXICO, Los Alamos Scientific Lab., N. Mex.

W. D. Purtymun. LA-5744, October 1974. 9 p, 1 fig, 7 tab, 7 ref. AEC Contract W-7405-ENG.36.

Descriptors: *Radioactive wastes, *Sediments, *Sediment transport, *Storm runoff, Sediment discharge, *New Mexico, Effluents, Waste treatment, Suspended load, Radioactivity, Precipitation(Atmospheric). Identifiers: DP Canyon(Los Alamos County NM).

Investigations were made to determine runoff volumes, suspended sediment loads, and amounts of radioactivity carried out of DP Canyon by storm runoff. Radionuclides contained in the waste treatment plant effluent at Los Alamos Scientific Laboratory's Technical Area 21 are discharged to the canyon where they are bound to stream channel sediments which are later carried away by storm runoff. Twenty-three runoff events, during the summer of 1967, carried off approximately 88,000 kilograms of suspended sediment in approximately 36,800 cubic meters of water. Less than 74 microcuries of gross alpha and approximately 40,100 microcuries of gross beta were transported out of the canyon in solution. Suspended sediments carried approximately 70 microcuries of gross alpha and 11,300 microcuries of gross beta. About 31,000 microcuries of Strontium-90, 5.9 microcuries of Plutonium-238, 7.0 microcuries of Plutonium-239, and 9.1 microcuries of Americium-241 left the canyon in solution. (Harmeson-ISWS)

IMPACT OF HUMAN ACTIVITIES ON THE QUALITY OF GROUNDWATER AND SURFACE WATER IN THE CAPE COD AREA,

Massachusetts Univ., Amherst. Water Resources Research Center.

Available from the National Technical Information Service, Springfield, Va 22161, as PB-241 137, \$4.25 in paper copy, \$2.25 in microfiche. Completion Report, FY-74-6, Publication No 42, (1974), 56 p, 4 fig, 18 tab, 10 ref. OWRT A-043-MASS(1).

Descriptors: *Massachusetts, *Path of pollutants, Water quality, Environmental effects, *Groundwater, Surface waters, *Waste disposal,

*Craneberries, Urbanization, Industrial wastes, Water supply, City planning, Septic tanks, Cesspools, Water pollution sources, Distribution patterns.

Identifiers: *Cape Cod(Mass), *Automobile traffic pollutants.

The effects of human activities on water quality were investigated. The disposal of waste causes the most adverse impact on water quality--groundwater in particular. Neither automobile traffic nor cranberry production appears to have a measurable impact on quality of water. These conclusions refer only to regular conditions. Irregular occurrences causing accidental pollution, such as spillage, direct application of chemicals to water, leaching from stockpiles, etc., require separate consideration. To preserve water quality in the Cape Cod area, planning activities should concentrate on the disposal of waste. Disposal through cesspools and septic tanks was adequate when the population figures were small, but rapid growth of towns without changes in the methods of waste disposal may lead to groundwater problems. Areas not served by public water supplies will probably be the first ones to be affected. W75-06644

DECOMPOSITION OF FOUR SPECIES OF LEAF MATERIAL IN THREE REPLICATE STREAMS WITH DIFFERENT NITRATE INPUT,

INPUT, Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.

F. J. Triska, and J. R. Sedell.

Available from the National Technical Information Service, Springfield, Va 22161, as PB-241 139, \$3.75 in paper copy, \$2.25 in microfiche. Oregon Water Resources Research Institute, Corvallis, Completion Report WRRI-29, February 1975. 35 p, 7 fig, 2 tab, 43 ref. OWRT A-021-ORE(1).

Descriptors: *Nitrates, Streams, *Decomposing organic matter, Leaves, *Litter, Solid wastes, *Small watersheds, Fertilization, Lumbering, Chemical oxygen demand, *Nutrient requirements, Water pollution sources.

Identifiers: *Leaf material, Replicate streams, Allochthonous debris.

Inputs of leaf litter and other allochthonous debris constitute the biological energy base of small watershed streams. The relationship of decompositon rate to nitrate inputs of a 3 - 4 fold magnitude was tested in three replicate experimental streams. Such a magnitude of nitrate inputs simulated possible input effects of nitrogen fertilization or logging, two common forest practices. At the levels tested, no significant increase in decomposition rate was observed on any of four litter species as a result of nitrate addition. Common parameters measured included weight loss, changes in carbon quality, absolute changes in nitrogen content, and microbial respiration measured as oxygen consumption. Results were partially confounded by growth of filamentous green algae during spring. As a result of chemical oxygen demand or leaf pack envelopment by the decaying algal mat, approximately one-third of the total oxygen consumption was not related to litter decomposition. Phosphate in conjunction with nitrate addition was not tested since phosphate did not appear limiting. Although not related to increases in nitrate con centration in water, decomposing litter did exhibit a twofold increase in nitrogen content following initial leaching. The mechanism of this increase, whether by biological or chemical means, remains to be investigated. Also, the impact of nutrient chemistry in such refractory materials as wood and bark should be the subject of future experi-W75_06649

Group 5B-Sources Of Pollution

BACTERIOLOGY OF STREAMS AND THE AS-SOCIATED VEGETATION OF A HIGH MOUN-TAIN WATERSHED,

Univ., Laramie. Water Resources Wyoming Un Research Inst.

Q. D. Skinner.

Available from the National Technical Information Service, Springfield, Va 22161, as PB-241 140, \$3.25 in paper copy, \$2.25 in microfiche. Completion Report, December 1974. 6 p, 5 ref. OWRT A-

Descriptors: "Wyoming, Watershed management, "Range management, "Bacteria, Water pollution sources, Vegetation, "Water quality, Monitoring, "Bioindicators, Streams.

Identifiers: *Nash Fork stream(Wyo), Mountain watershed, Nitrate reducing bacteria

The major objective was to relate variations of bacteria count with (1) vegetative types; (2) range conditions; (3) and various uses of the watershed. Three summers and two winters were spent moni-toring the water quality of the Nash Fork watershed on a weekly basis with selected bacteria tests. Results show that the range conditions of the Nash Fork study area can be classified as being in good condition. There exists a seasonal variation in the various bacteriological groups monitored. Total coliforms, fecal coliforms and entercocci reach peak concentrations in late summer. The main source of pollution appears to be animals rather than humans. There existed little difference in variations of bacteria counts between vegetation types, with the exception of nitrate reducing bacteria which had higher counts below wet meadows. The ski area had an effect on bacteria counts during the operating season. Although ef-fluent was chlorinated and fecal organisms killed off, there existed a rise in counts of nitrate and sulfate reducing bacteria below the ski area. Possi-bilities for combining the sciences of range management and bacteriology are many. However, research must continue for determining the ecological significance of different vegetation types as related to numbers and various populations of bacteria found in streams draining the vegetated areas. W75-06650

SURVEY OF BACKGROUND WATER QUALITY IN MICHIGAN STREAMS.

Michigan, Department of Natural Resources, Detroit, Michigan, November 1970. 47 p, 18 fig, 2 tab, 9 ref, 3 append.

Descriptors: *Water quality, *On-site date collections, *Water analysis, *Michigan, *Natural streams, Chemical analysis, Biological properties, Physical properties, Sampling, Water chemistry, Water pollution effects. Identifiers: "Michigan streams.

To help protect and conserve its water resources, the State of Michigan has adopted objectives for implementing and enforcing selected chemical, physical and biological water characteristics. To achieve these objectives, water samples were collected at 154 stations on streams thru-out the state from August 1967 to January 1968. Analyses were made of 22 different parameters. The Upper Peninsula of the state has exceptionally good water quality. A combination of favorable soil and drainage characteristics, extensive forest cover drainage characteristics, extensive forest cover and relatively little human perturbation account for this high level of quality. The southeastern part of the Lower Peninsula has unfavorable soil types, poor drainage and sparse vegetation, as well as cultural activities of a synergistic nature, which compound the negative influence of water quality. The northern half of the Lower Peninsula, with its sandy soils, fairly heavy vegetative cover and only moderate development, benefits from water of a quality which, for the most part, approaches that of the Upper Peninsula waters. The pressures of population, economic activity and recreational uses are beginning to cause concern in some parts

of this region, however, and future growth patterns will be significant in determining the fate of its waters. Much of the agricultural activity of the state is centered in the southern Lower Peninsula due to favorable soil conditions and climate. W75-06662

LANE COUNTY PRELIMINARY GENERAL PLAN-WATER QUALITY REPORT.
Lane Council of Governments, Eugene, Oreg. January, 1974. 138 p, 8 tab, 106 fig.

*Planning Descriptors: Descriptors: *Water quality, *Planning, *Reservoirs, *Water utilization, *Water pollution sources, *Dissolved oxygen, Biological demand, Turbidity, Temperature, Sediments, Rivers, Oregon, On-site investigations, Water ality control, Hydrologic data, Governments. Identifiers: Lane County(Oregon).

A detailed examination was made of the existing quality of water resources in Lane County, Oregon. Sections of this report deal with hydrology, water quality parameters, water use, and pollu-tion sources in Lane County. The water quality of four main areas was studied. These areas are: the Middle Fork Willamette sub-basin, the Coast Fork Willamette sub-basin, the McKenzie sub-basin, and the Main Stem Willamette sub-basin. Graphs indicating parameters such as B.O.D., pH, tem perature, turbidity, bacterial loads, and dissolved oxygen are given for each of these areas. The quality of Lane County was found to be quite high. This was attributed to three factors: nu-merous streams, high rates of flow, and the origination of streams in uninhabited mountain regions. Major problems occur on those streams that are relatively sluggish and pass through areas where human activity is concentrated. The Mohawk, Long Tom, and portions of the Coast Fork and Main Stem Willamette have slow meandering reaches and are affected by extensive development. Other chronic water quality problems are related primarily to the prevalence of clay soils, various land use influences, and the effect of the many reservoirs. (Poertner)

DISTRIBUTION OF ISOTOPES IN SOME NATURAL WATERS IN THE REGION NORTH OF MT. JOLMO LUNGMA.

primary bibliographic entry see Field 2K. W75-06699

POTAMOLOGICAL STUDIES ON THE RIVER INA OF THE RIVER SYSTEM OF YODO: 1 (IN

JAPANESE), Osaka Kyoiku Univ. (Japan). Oceanography Lab. Masao Kobayashi, and Akikazu Nakamura. Mem Osaka Kyoiku Univ III Nat Sci Appl Sci. 21, p 135-159, 1972, Illus, English summary.

Descriptors: Asia, *Rivers, *Rainfall, Precipita-tion(Atmospheric), *Potamology, Water quality, *Water pollutants, Chemical analysis. Identifiers: Japan(Ina River), Yodo.

Two kinds of observations one consecutive at a few stations and another itinerant along the River Ina (Japan) were made. The data were collected a few days after rainfalls. The variations of water rew days after rainfalls. The variations of water temperature and the quality of river water at 3 sta-tions was measured hourly for 24 h or 7 h (10:00 17:00). Water temperature is influenced by at-mospheric conditions. pH is comparatively high at day time and rather low at night, and a diurnal variation of 4.3 alkalinity is similar to pH. Very low chlorinity is observed with heavy precip and small values of chemical oxygen (COD) and SiO2 and slightly large values of Ca2+ are measured when the precipitation is low. The variations of Cl, COD and SiO2 are very large and complicated. At the confluence near the Golf Bridge, the main course shows large values of pH, 4.3 alkalinity and Ca2+ and small values of COD and SiO2, while the tributary shows a small value of 4.3 alkalinity, a large value of SiO2 and almost constant values of pH and Ca2+ even when the amount of precipitation is large. Comparisons between 7-h and 24-h observations and of these components suggest that 24-h means may be estimated by 7-h means of water temperature, pH and 4.3 alkalinity.--Copyright 1974, Biological Ab-

THE SOLUBILITY OF SILICA IN CARBONATE WATERS,

For primary bibliographic entry see Field 2K. W75-06703

THE BOTTOM FAUNA OF LAKE LILLE-JON-SVANN, TRONDELAG, NORWAY, Kongelige Norske Videnskabers Selskab, Trond-

heim, Museet.

J. O. Solem. Norw J Zool. Vol 21, No 3, p 227-261, 1973, Illus. Identifiers: Autumn, Bivalvia, *Bottom fauna, Coleoptera, Gastropoda, Heteroptera, Hirudinea, Insects, Lakes, Migration,
*Norway(Lake Lille-Jonsvann),
Oviposition, Trichoptera, Trondelag. Oligochaeta,

Quantitative bottom fauna investigations covering the littoral and sublittoral zones in the mesotrophic lake Lille-Jonsvann (62 deg 23 minutes N, 10 deg 33 minutes E), Trondheim, are presented. Higher taxa particularly treated are Oligochaeta, Hirudinea, Heteroptera, Trichoptera, Coleoptera, Gastropoda, and Bivalvia (Sphaeriidae). Of the total fauna, the insects represent 62% of the number of specimens and 39% of the biomass in the depth range 0.2-10 m. The corresponding values of the mollusks are 27% and 47%, respectively. The insects and the mollusks are by far the dominating animal groups. Three of the species treated clearly showed migration to deeper water in autumn and factors affecting the migration are discussed. A correlation between the depth distribution of the caddis larvae and the oviposition procedure of the females is discussed .-- Copyright 1974, Biological Abstracts, Inc.

THE BOTTOM FAUNA OF LAKE HUDDING-SVATN, BASED ON QUANTITATIVE SAM-PLING,

Kongelige Norske Videnskabers Selskab, Trond-heim. Museet. B. Sivertsen.

Norw J Zool. Vol 21, No 4, p 305-321, 1973, Illus. Identifiers: *Bottom fauna, Chironomidae, Gammarus-lacustris, Insects, Lakes, *Norway(Lake Huddingsvath), Oligochaeta, Peloscolex-ferox, *Sampling, Trondheim.

Bottom samples taken from Lake Huddingsvatn during the years 1965-1968 were analyzed. In the lake, about 300 km northeast of Trondheim, Norway, Chironomidae and Oligochaeta were the predominant groups, followed by Gammarus lacustris. Of the Chironomidae, Chironomini were predominant where the bottom was rich in organic detritus. On poorer bottom substrate Orthocladiinae predominated. Of the Oligochaeta, Peloscolex ferox alone accounted for 77%. The faunal variation between the different years was small, with the insect groups showing the greatest variation. The mean values of abundance showed similar variation during a 4-yr period in Lake Huddingsvatn and a lake situated 10 km away in the same watercourse .-- Copyright 1974, Biological Abstracts, Inc. W75-06717

EFFECT OF WATER POLLUTION ICHTHYOFAUNA: PART I. TOXICITY

Sources Of Pollution-Group 5B

METALS AND THEIR SALTS AND OF INOR-GANIC SUSPENSIONS (IN POLISH), Wyzsza Szkola Rolnicza, Krakow (Poland). For primary bibliographic entry see Field 5C. W75-06719

THE STRUCTURE OF ECOSYSTEMS, Illinois Univ., Urbana. Center for Advanced Computation. For primary bibliographic entry see Field 6G.

THE RELATIONSHIP RETWEEN THE DM (DRY MATTER) CONTENT OF HERBAGE FOR SILAGE MAKING AND EFFLUENT PRODUC-

TION, Hannah Dairy Research Inst., Ayr (Scotland).

M. E. Castle, and J. N. Watson. J Br Grassl Soc. Vol 28, No 3, p 135-138. 1973,

Identifiers: Bacteria, *Dry matter, *Effluents, Equations, Geotrichum-candidum, *Herbage, Pol-lution, Crop production, Regression equations, Scotland, *Silage, Wilting.

A study of 16 silages made at the Hannah Research Institute, Scotland, and 22 silages made at the Grassland Research Institute showed highly significant positive relationships between the dry matter (DM) percentages of the material ensiled and the resultant silage. Regression equations derived from this data and from a record of the presence or absence of effluent were used. The average minimum DM content of herbage for ensiling which would produce no effluent was 22.9% To ensure a margin of safety against production of effluent, a minimum DM content of 24.7% in the herbage was calculated from the confidence limits. To obtain this DM content, herbage will normally require wilting; effluent production should then be negligible. Most silage effluent is regarded as undesirable in drains, streams and rivers. Silage eftain water-borne bacteria and a fungus (Geotrichum candidum) which can grow in drains.-Copyright 1974, Biological Abstracts, Inc. W75-06725

ENVIRONMENTAL CONTAMINANTS INVEN-TORY STUDY NO. 2 - THE PRODUCTION, USE AND DISTRIBUTION OF CADMIUM IN

Canada Centre for Inland Waters, Burlington (Ontario).

D. B. Lymburner. Report Series No. 39, 71 p, 1974, Environment Canada, Inland Waters Directorate, Ottawa, Canada. 7 fig, 110 ref, 13 tab, append.

Descriptors: *Cadmium, *Environmental effects, Data collections, "Canada, Pollutants, Toxicity, Economics, Metals, Disposal, Distribution, "Path of pollutants, Water pollution sources. Identifiers: Production, Environmental levels.

Preliminary information is presented on cadmium occurrence, characteristics, production process, global economic significance and major uses. The structure of cadmium production and use in Canada is then analyzed using quantitative data on production, consumption by end use, imports and exports. This information is illustrated by a material flow chart, and maps detailing the distribution of establishments involved in the production and consumption of cadmium are included. Throughout the analysis, environmental inputs are computed where possible. Occupations entailing potential exposure to cadmium are listed and a selected bibliography of references on cadmium toxicity is provided. (Environment Canada) W75-06742

COMPUTER ROUTINE FOR CALCULATING TOTAL LAKE VOLUME CONTENTS OF A DIS-

SOLVED SUBSTANCE FROM AN ARBITRARY DISTRIBUTION OF CONCENTRATION PROFILES - A METHOD OF CALCULATING LAKEWIDE CONTENTS OF DISSOLVED SUB-STANCES.

Canada Centre for Inland Waters, Burlington (Ontario). For primary bibliographic entry see Field 2H.

SUBSURFACE DISPOSAL OF WASTE IN CANADA - II, DISPOSAL-FORMATION AND INJECTION-WELL HYDRAULICS, Department of the Environment (Ontario). Water Resources Branch. Ottawa For primary bibliographic entry see Field 5E. W75-06750

SUBSURFACE DISPOSAL OF WASTE IN CANADA - III - REGIONAL EVALUATION OF POTENTIAL FOR UNDERGROUND DISPOSAL OF INDUSTRIAL LIQUID WASTES. Water Resources Branch.

For primary bibliographic entry see Field 5E. W75-06751

AN ASSESSMENT OF AREAL AND TEMPORAL VARIATIONS IN STREAMFLOW QUALITY USING SELECTED DATA FROM THE NATIONAL STREAM QUALITY ACCOUNTING NETWORK

Geological Survey, Reston, Va. T. D. Steele, E. J. Gilroy, and R. O. Hawkinson. Geological Survey open-file report 74-217, August 1974. 210 p, 10 fig, 9 tab, 31 ref, 8 append.

Descriptors: "Water quality, "Variability, *Statistics, Hydrologic data, Fourier analysis, *Data collections, Statistical methods, Water tem-*Variability, perature, Networks. Identifiers: Harmonic analysis.

Streamflow chemical-quality data and stream-tem perature data at 88 stations throughout the United States and Puerto Rico were analyzed to develop and to evaluate methodologies for the general assessment of the variation of the Nation's stream-flow quality conditions. Lowest harmonic am-plitudes, which are indicative of little seasonal variability in stream temperature, were observed in Florida, along the eastern Gulf coast, and along the Pacific coast. Greatest annual variations in stream temperatures exist in the Souris, Red (of the North), and Missouri River basins. Trends in stream temperature were found to exist in the Atlantic coast above Florida; Florida and the eastern Gulf: the Souris River, Red River of the North. and Missouri River basins; the Texas Gulf and Rio Grande area; the Colorado River basin; and the Pacific coast area. Significant trends were found in the long-term streamflow chemical quality record at 15 of 88 stations analyzed. Of these stations, 10 showed an increase in levels of specific conctances while 5 showed a decrease. Trends were indicated for water-quality data in the Atlantic coast above Florida; the Souris River, Red River of the North, and Missouri River basin; the Arkansas and Red River basins; the Texas Gulf and Rio Grande area; the Colorado River basin; and the Pacific coast area. (Knapp-USGS) W75-06755

REPORT ON THE CHARLES RIVER: A STUDY OF WATER POLLUTION, Massachusetts Water Resources Commission,

Boston. Div. of Water Pollution Control. W. R. Jobin, and A. F. Ferullo. March 1971. 48 p, 13 fig, 10 tab, 17 ref, 4 append.

Descriptors: *Water quality standards, *Water quality control, Water pollution, *Water pollution control, *Water pollution sources, River flow, Biochemical oxygen demand, Phosphates, Massachusetts.

Identifiers: *Charles River(Mass), Boston(Mass), Milford(Mass), Waterton(Mass).

Although assigned a C classification by the Water Quality Standards of 1967 a survey indicated that the entire lower basin of the Charles River was below the acceptable standards. Proposals recommend raising the river to Class B standards, suitable for bathing. The study investigated tributary streams; combined sewer overflows (the major streams; combined sewer overflows (the major sources of pollution); water quality (bacteria, dissolved oxygen, algae, salinity, and bottom deposits); a storm detention and chlorination facility; present and proposed projects for enhancement of water quality, river flow, phosphate and BOD discharges; and the assimilative capacity of the river. The cost of raising the twent to a Colorification is 52 willion. river to a C classification is \$32 million, \$5 million for a detention and chlorination facility for sewer overflows and \$27 million for a new dam decreasing saline intrusions to the basin. The best method of raising the river to B classification is a proposed deep tunnel requiring \$500 million and 5 to 10 years but which would remove pollution from Boston Harbor as well as the basin. Other alternatives are presented: separating the combined sewers, \$51 million; another stormwater detention facility, \$10 million; and careful pollution control management, but results would be less beneficial along with the lesser costs. (Park-North Carolina)

SOLID WASTE DISPOSAL AND OCEAN DUMP-

Naval War Coll., Newport, R.I. J. W. Sellers.

Marine Affairs Journal, Number 1, p 52-77, December 1973.

Descriptors: *Oceans, *Waste disposal, *Solid wastes, *Water pollution sources, Water pollution, Sludge, Water management, Planning, Legislation

Identifiers: Ocean dumping, Solid waste disposal.

Legislation and control to harness pollution sources must be tempered with astute research, planning, analyses and management of waste disposal in a manner most beneficial or, at the worst, least harmful to the environment and to man. The solid waste problem is examined and the marine environment as a depository for wastes as compared with alternative methods of disposal is discussed. The physical and biological nature of the oceans is discussed especially in terms of as-similative capacity. Most problems are generated locally and could be resolved through control. EPA presently administers the policy on ocean dumping issuing permits for waste transportation and dredge dumping. EPA is currently developing guidelines to implement legislation which seeks to diminish dumping of toxic materials. Solid wastes have been identified, yet absolute control is constrained by several factors including uncertainties and effects of pollutants, data availability, future potential (recycling), problem perception and af-fluence. Solution to the solid wastes problem rests with how best to utilize the marine environment and/or to determine the utility of all disposal methods based on benefit-cost analysis. These al-ternatives include recycling, landfill, burning, and life style changes; each generates new kinds of problems. Research is necessary to determine per-missible level of ocean dumping; meanwhile management must consider solid waste disposal in terms of economic, conservation, social, and psychological needs and environmental goals.
(Salzman-North Carolina)

HEALTH AND SAFETY LABORATORY FAL-LABORATION FALL
LOUT PROGRAM, QUARTERLY SUMMARY
REPORT (JUNE 1, 1974 THROUGH SEPTEMBER 1, 1974),
Health and Safety Lab. (AEC), New York.
For primary bibliographic entry see Field 5A.

Group 5B-Sources Of Pollution

DEPTH DISTRIBUTIONS OF GLOBAL FAL-LOUT SR90, CS137, AND PU239, 240 IN SANDY LOAM SOIL, Health and Safety Lab. (AEC), New York

For primary bibliographic entry see Field 5A.

FALLOUT PU 239, 240 IN DIET, Health and Safety Lab. (AEC), New York For primary bibliographic entry see Field 5A. W75-06798

SEDIMENT SAMPLING NEAR MOUND LABORATORY - JULY 1974, Health and Safety Lab. (AEC), New York. For primary bibliographic entry see Field 5A. W75-06800

ENVIRONMENTAL RADIOACTIVITY ANNUAL REPORT 1973 (NEW ZEALAND). National Radiation Lab., Christchurch (New Zealand). Dept. of Health. For primary bibliographic entry see Field 5A. W75-06803

APPENDIX TO HEALTH AND SAFETY LABORATORY FALLOUT PROGRAM, QUAR-SAFETY TERLY SUMMARY REPORT (JUNE 1, 1974 THROUGH SEPTEMBER 1, 1974). Health and Safety Lab. (AEC), New York. For primary bibliographic entry see Field 5A. W75-06804

STRONTIUM 90 AND STRONTIUM 89 IN MONTHLY DEPOSITION AT WORLD LAND Health and Safety Lab. (AEC), New York. For primary bibliographic entry see Field 5A. W75-06805

HEALTH AND SAFETY LABORATORY FAL-LOUT PROGRAM QUARTERLY SUMMARY REPORT, (SEPTEMBER 1, 1974 THROUGH DECEMBER 1, 1974), Health and Safety Lab. (AEC), New York. For primary bibliographic entry see Field 5A. W75-06818

REGIONAL UNIFORMITY OF CUMULATIVE RADIONUCLIDE FALLOUT, Health and Safety Lab. (AEC), New York. For primary bibliographic entry see Field 5A. W75-06819

ANALYSES OF QUALITY CONTROL SAMPLES AT HASL AND A CONTRACTOR LABORATO-RY DURING 1974, Health and Safety Lab. (AEC), New York. For primary bibliographic entry see Field 5A.

APPENDIX TO HEALTH AND SAFETY LABORATORY FALLOUT PROGRAM QUARTERLY SUMMARY REPORT, (SEPTEMBER 1, 1974 THROUGH DECEMBER 1, 1974), Health and Safety Lab. (AEC), New York. For primary bibliographic entry see Field 5A. W75-06823

SR 90 AND SR 89 IN MONTHLY DEPOSITION AT WORLD LAND SITES. Health and Safety Lab. (AEC), New York. For primary bibliographic entry see Field 5A. W75-06824

RADIONUCLIDES AND LEAD IN SURFACE AIR, Health and Safety Lab. (AEC), New York.

For primary bibliographic entry see Field 5A. W75-06825

RADIOSTRONTIUM IN MILK AND TAP

Health and Safety Lab. (AEC), New York. For primary bibliographic entry see Field 5A.

DYE AND DROGUE STUDIES OF SPOIL DISPOSAL AND OIL DISPERSION, Delaware Univ., Newark. Coll. of Marine Studies. V. Klemas, D. Maurer, W. Leatham, P. Kinner, and W. Treasure.

Journal of the Water Pollution Control Federation, Vol 46, No 8, p 2026-2034, August, 1974. 18 fig, 12

Descriptors: *Dredging, *Dye, *Currents(Water), Sediments, Estuaries, Circulation, Oil pollution, Dispersion, Path of pollutants, Water pollution sources, Waste disposal.

Identifiers: *Hydrographic circulation, Drogue, Surface water movement, Aquatic frontal system, Tidal flow, *Delaware Bay.

As part of a study to determine short-term consequences of dredging and dumping on benthic invertebrate colonies near the mouth of the Delaware Bay, a sampling grid for geological and biological stations was designed before dredging commenced. Dye and drogue studies were made to map the general hydrographic circulation in order to establish these stations, and a dye study was also made of surface water movement at a sug-gested off-shore oil terminal location. The procedures used and results obtained from these studies, which utilized aircraft-boat, radio-coordinated teams, are presented. (Nelson-FIRL) W75-06831

NEW INDICATOR SPECIES IN THE BALTIC

ZOOPLANKTON IN 1972, Wyzsza Szkola Rolnicza, Szczecin (Poland). Instytut Eksploatacji Zasobow Morza. T. Radziejewska, J. Chojnakci, and J. Maslowski. Mar Biol (Berl), Vol 23, No 2, p 111-113, 1973.

Identifiers: Aetideus-armatus, *Baltic Sea, Centropages-typicus, Ectopleura-dumortieri, Electra-pilosa, Eucalanus-elongatus, Hydrographic studies, Metridia-Lucens, Plankton, Rosacea-plicata, Tomopteris-kefersteini, *Zoo *Bioindications, *Saline water intrusion *Zooplankton,

The occurrence of zooplankton species, indicating a saline-water influx from the North Sea into the Baltic Sea in 1972, is described. Particular attention is paid to 8 spp. so far unknown in this region (Ectopleura dumortieri, Rosacea plicata, Tomopteris kefersteini, Aetideus armatus, Centropages typicus, Eucalanus elongatus, Metridia lucens, Electra pilosa). The appearance of these zooplank-ters in the Southern Baltic Sea is discussed in relation to the hydrographic changes taking place in this area in 1972. Assessments are made regarding the intensity of dynamic exchange processes in the Baltic and North Atlantic waters in 1972 .-- Copyright 1974, Biological Abstracts, Inc. W75-06837

5C. Effects Of Pollution

SENSITIVITY OF VERTEBRATE EMBRYOS TO HEAVY METALS AS A CRITERION OF WATER QUALITY - PHASE II BIOASSAY PROCEDURES USING DEVELOPMENTAL STAGES AS TEST ORGANISMS, Kentucky Water Resources Inst., Lexington. For primary bibliographic entry see Field 5A. W75-06352

CONTRIBUTIONS OF TIDAL WETLANDS TO ESTUARINE FOOD CHAINS,

Maryland Univ., Prince Frederick. Center for Environmental and Estuarine Studies.

D. R. Heinle, D. A. Flemer, J. F. Ustach, and R. A.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 975, \$3.75 in paper copy, \$2.25 in microfiche. Maryland Water Resources Research Center, College Park, Technical Report No 29 (1975). 34 p, 1 fig, 4 tab, 21 ref, append. OWRT B-019-MD(1). 14-31-0001-4091.

Descriptors: *Detritus, *Nutrients, *Marshes, Food chains, Estuaries, *Maryland, Wetlands, Carbon, Production. Identifiers: Carbon balance, *Patuxent estuary(Md), Adenosine triphosphate.

Flows of detritus and nutrients from stable marshes in the upper Patuxent estuary subjected to low tidal amplitude were slight. The quantity of particulate carbon flowing from the marsh to the estuary was less than 10% of annual production. By contrast, a portion of the marshes subjected to scouring by ice lost virtually all of its above ground biomass to the estuary and contributed over half of the annual carbon budget to the system. An appendix entitled 'Problems with Adenosine Triphosphate Measurements in the Patuxent River Marshes' concluded that this technique is a poor biomass indicator for the marshes W75-06353

PHYTOPLANKTON POPULATIONS IN RELA-TION TO DIFFERENT TROPHIC LEVELS AT WINNIPESAUKEE LAKE, NEW HAMPSHIRE, U.S.A.,

New Hampshire Univ., Durham. Dept. of Botany. H. W. Yeo, and A. C. Mathieson. Available from the National Technical Informa-tion Service, Springfield, Va 22161 as PB-240 981, tion service, springried, va 22161 as PB-2404 98, 86.25 in paper copp, \$2.25 in microfiche. New Hampshire Water Resources Research Center, Durham, Completion Report, February, 1973. 155 p, 77 fig. 9 tab. 49 ref. OWRT A-019-NH(1).

Descriptors: "Phytoplankton, "New Hampshire, "Trophic level, Lakes, Phosphates, Nitrates, Silicates, Nitrogen, "Nutrients, Cyanophyta, "Eutrophication, "Mesotrophy, Period of growth, Plant groupings, Water pollution effects.

Identifiers: Lake Winnipesaukee(NH), Myxophycean plankton, Newfound Lake(NH), Lake Winnisquam(NH). Winnisquam(NH).

Composition, abundance, and seasonal periodicity of phytoplankton at Lake Winnipesaukee were determined. Trophic levels were evaluated for the entire lake and for eight individual stations. The study also compared the trophic levels of Lake Winnipesaukee with Newfound and Winnisquam Lakes. Samples of phytoplankton were taken from three to six depths at eight stations with a 4-liter Van Dorn water sampler. Water samples were also taken for nutrient analyses of orthophosphate. total phosphates, nitrate-nitrogen and silicon dioxide. The response of phytoplankton to nutrient enrichments of nitrates, phosphates and silicates was evaluated. The differences in phytoplankton numbers (cell/ml) and nutrient levels were compared with previous records at Winnisquam and Newfound Lakes. The nutrient levels at Winnipesaukee were in excess of those previously found at Newfound and Winnisquam Lakes. The species diversity at Winnipesaukee Lake was much greater than at either of the other two lakes. The blue-green algae were the dominant phytoplankters. The concept of phytoplankton associations was useful in evaluating the trophic level of Lake Winnipesaukee. Although dominated by a Eutrophic Myxophycean Plankton, oligotrophic phytoplankton associations also are evident. The application of the phytoplankton quotient concept, to the individual stations provided a mesotrophic

Effects Of Pollution—Group 5C

rating for four stations while four other stations were categorized as eutrophic. A collective interpretation of the representative phytoplankton associations also indicated mesotrophy as the trophic level of the overall lake.

THE CHRONIC EFFECTS OF COPPER AND ZINC ON FISHES,

Oklahoma State Univ., Stillwater. Dept. of Biolog-

ical Sciences. M. R. Curd, and H. R. Jarrell.

Stillwater, Oklahoma Water Resources Research Institute, Termination Report (March 1975). 3 p. OWRT A-033-OKLA(1). 14-31-0001-4036.

Descriptors: Water pollution effects, Toxicity, Fish, Perch, *Sunfishes, Channel catfish, *Zinc, *Copper, Growth rates, Histopathology, *Lethal limit, *Growth stages, *Juvenile growth stage,

Identifiers: *Sublethal concentrations, *Logperch.

Initial objectives were to determine effects of sublethal concentrations of copper and zinc on eggs and juvenile stages of logperch Percina caprodes and the longear sunfish Lepomis megalotis, to determine effects of sublethal amounts of zinc on the growth rates and to determine the synergestic effects, if any, of sublethal mixtures of zinc and copper. The fourth objective was to determine the histological differences, if any, between controls and fishes subject to treatit as above. Because copper levels as low as 0.1 ppm (the minimum level tested) proved to be lethal to eggs and juvenile stages, sufficient numbers of fish could not be raised to obtain the original ob jectives. Subsequent research with channel catfish fry was attempted but disease and continued extraneous substrate toxicity of both control and experimental aquaria prevented obtaining results of other than highly questionable value. W75-06364

EFFECTS OF BORON-WATER ON RATS, Nevada Univ., Reno. Coll. of Agriculture.
G. H. Green, M. D. Lott, and H. J. Weeth.
Proceedings, Western Section, American Society
of Animal Science, Vol 24, p 254-258, 1973. 1 fig, 3
tab, 10 ref. OWRT A-053-NEV(1).

Descriptors: *Boron, *Bioassay, *Growth rates,

Identifiers: *Subtoxic effects, Rats, *Tissue analysis.

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Two experiments were conducted on growing rats to determine subtoxic effects of boron in the drinking water. One experiment tested the effects of 300 mg B/liter and determined this level to cause subtoxic responses. The other experiment tested the ability of the testes to recover from four levels of boron (0, 75, 150, and 300 mg B/liter) and determined that levels above 150 mg B/liter caused irreversible testis damage. Levels less than 75 mg B/liter seemed to have no significant effects. (Katz) W75-06376

EFFECT OF POLYCHLORINATED BIPHENYLS (PCB'S) ON SURVIVAL AND REPRODUCTION OF DAPHNIA, GAMMARUS, AND TANYTAR-

SUS, National Water Quality Lab., Duluth, Minn. A. V. Nebeker, and F. A. Puglisi.
Transactions of the American Fisheries Society, No 4, p 722-728, 1974. 9 tab, 15 ref.

*Polychlorinated Descriptors: biphenyls. Perophors: "Folyenionnated opinentys, "Reproduction, "Bioassay, "Arcolor, Analytical techniques, Toxicants, Lethal limit, Midges, Growth rates, "Water pollution effects. Identifiers: "Gammarus pseudolimneaus, Identifiers: *Daphnia magna, *Tanytarsus dissimilis.

Continuous-flow and static bioassays were conducted at 18C, with survival and reproduction as measures of relative toxicity of eight PCB's. Three PCB-mixture bioassays were also conducted. Aroclor 1248 was the most toxic to Daphnia magna of the eight Aroclors tested in static tests; the 3-wk LC50 was 25 microgram/liter. Aroclor 1254 was the most toxic PCB to Daphnia under continuousflow conditions with a 3-wk LC50 of 1.3 micro-gram/liter. Ninety-six-hr LC50 values for Aroclor 1242 (A-1242) and A-1248 on Gammarus pseudolimnaeus in continuous-flow tests were 73 and 20 microgram/liter. Reproduction and survival of young were good at 2.8 microgram/liter A-1242 and 2.2 microgram/liter 1248. The midge Tanytarsus dissimilis did not emerge in abundance above 5.1 microgram/liter A-1248 or 3.5 microgram/liter A-1254. The 3-wk LC50 for Aroclor 1254 was 0.65 microgram/liter for larvae and 0.45 microgram/l for pupae. Tissue residues for G. pseudolimnaeus ranged from 4.0 microgram/g A-1254 in control animals to 552 microgram/g A-1248 in scuds held for 60 days in water containing 5.1 microgram/liter A-1248. (Katz) W75-06377

THE EFFECTS OF LEAD ON ALGAE, I: EFFECTS OF PB ON VIABILITY AND MOTILITY OF PLATYMONAS SUBCORDIFORMUS (CHLOROPHYTA: VOLVOCALES),

Scripps Institution of Oceanography, La Jolla, Calif

A. Hessler. Water, Air and Soil Pollution, Vol 3, No 3, p 371-385, 1974. 8 fig, 3 tab, 16 ref.

Descriptors: *Lead, *Reproduction, *Viability, *Algae, *Growth rates, Movement, Primary productivity, Heavy metals, Water pollution sources, *Water pollution effects, Biological pro-

perties. Identifiers: Identifiers: *Platymonas *Sublethal effects, Flagella. subcordiformis.

The effects of lethal and sublethal concentrations of PbCl2 on reproduction, viability, and motility of a marine unicellular green flagellate alga, Platymonas subcordiformis, were studied under controlled laboratory conditions. The severity of the effects depended primarily upon the concentration of Pb++ and the duration of treatment. Log phase cells were most sensitive than stationary phase cells. Sublethal amounts of Pb (2.5 and 10 mg/liter Pb++) tended to retard population growth delaying cell division and daughter cell separation. A lethal amount of Pb (60 mg/liter Pb++) caused inhibition of growth and cell death Various intracellular abnormalities resulted from Pb treatment. The flagella were shed or altered in a variety of ways, depending on Pb concentration; motility was least affected by low Pb and completely impaired by high Pb. Normal wild-type cells appeared to be more sensitive to Pb than mechanically sheared (flagella-less) cells and cells of a non-flagellate mutant of Platymonas. Exposure of cells to Pb in non-growth conditions of dark and cold (2 degrees C) had little negative effect. (Katz)

THE EFFECT OF ULTRA LOW VOLUME AERIAL DISPERSAL OF NALED ON AN AQUATIC HABITAT, EHL(K)74-25, OCTOBER

Environmental Health Lab., Kelly AFB, Tex. J. M. Livingston, and J. T. Goodwin.

Available from the National Technical Informa-tion Service, Springfield, Va 22161 as AD-787 653, \$3.25 in paper copy, \$2.25 in microfiche. October 1974. 15 p, 1 fig, 5 tab, 6 ref.

Descriptors: *Insecticides, *Aquatic habitats, *Insect control, *Water pollution effects, Pesticides, Aquatic insects, Mosquitoes, Pest control, Pesticide toxicity, Fish, Mortality.

Identifiers: *Dibrom, *Naled, *Acetylcholinesterase.

Ultra low volume aerial applications of naled (Dibrom 14) at 0.7 and 1.5 oz per acre were made at Robins AFB Ga. on 31 July, 1974. The effects of the spray on non target aquatic organisms were monitored utilizing caged fish, shoreline sampling, drift traps, drop traps, acetylcholinesterase levels in fish brain and other observations. Acetylcholinesterase activity in fish brains was depressed in the treated areas but no significant mortality of fish was noted. No gross effect on the normal fauna was observed. From this test it is concluded that no extensive monitoring activities are required for routine spray missions using conventional rates of naled, but closely spaced, multiple applications may require monitoring. (Katz) W75-06380

THE CHEMICAL TOXICITY OF ELEMENTS, Battelle-Pacific Northwest Labs., Richland, Wash. Water and Land Resources Dept. G. W. Dawson.

June 1974. 25 p, 1 tab, 28 ref.

Descriptors: *Toxicity, *Chemical properties, *Elements(Chemical), *Radioactive wastes, *Water pollution sources, Water quality standards, Radioactive waste disposal, Water pollu-

The inherent chemical hazards of the materials found in radioactive wastes should be understood and considered when dealing with the management of these wastes. Acceptable threshold levels for the 104 known elements in air and water intended the fow known elements in air and water intended for potable supply, propagation of aquatic life and irrigation purposes are delineated. A final data point was added to indicate a limiting marine level beyond which edible species could concentrate elements to hazardous levels in their flesh. Many values are estimations or extrapolations from acute effect data or from chemical similitude to other elements. (Katz) W75-06381

GROWTH RESPONSE OF A MARINE PHYTOPLANKTON COCCOLITHUS HUXLEYI, TO VARIOUS CHEMICAL FORMS OF COBALT,

Oregon State Univ., Corvallis, School of Oceanog-

H. L. Longaker. Available from the National Technical Information Service, Springfield, Va 22161 as RLO 2227-T-1244, \$6.25 in paper copy, \$2.25 in microfiche. M.S. Thesis, June 1974. 52 p, 3 fig, 11 tab, 43 ref,

Descriptors: *Nutrient requirements, *Growth rates, *Phytoplankton, *Cobalt metals, Trace elements, Statistical methods, Primary productivity, Water pollution effects.
Identifiers: *Cocculithus huxleyi, *EDTA,

Two experiments were performed on Coccolithus huxleyi, a marine phytoplankton, to determine if Co(III)-EDTA is more efficacious in stimulating growth than Co(II)-EDTA. One experiment had cobalt concentrations of 10 and 1 micro g/l; the other had concentrations of 1 and 0.1 micro g/l. In both experiments there were no observed dif-ferences in specific growth rates between treat-ments of Co(III)-EDTA with 0.000001 M additional EDTA and Co(II) with 0.000001 M EDTA. Both resulted in specific growth rates larger than controls without added EDTA or cobalt. It is not possible to measure the amount of Co(II)-EDTA that is oxidized to Co(III)-EDTA at these experimental concentrations. (Katz)

THE EFFECTS OF ENVIRONMENTAL STRESS ON THE COMMUNITY STRUCTURE AND PRODUCTIVITY OF SALT MARSH EPIPHYTIC COMMUNITIES: PROGRESS REPORT, City Coll., New York.

Group 5C-Effects Of Pollution

Available from the National Technical Informa-tion Service, Springfield, Va 22161 as COO-3254-20, \$10.00 in paper copy, \$2.25 in microfiche. Au-gust 1974. 138 p, 17 tab, 51 fig. AEC Contract No. AT(11-1)3254.

Descriptors: *Environmental effects, *Salt marshes, *Stress, *Food chains, *Productivity, Nutrient requirements, Nematodes, Trophic levels, Technology, Water pollution effects. Identifiers: *Epiphyte communities, Microcosm experiments.

Progress is reported on various projects related to a study of the effects of environmental stress on the community structure and productivity of salt marsh epiphytic communities. An apparatus has been developed that can be used for in situ experiments with aufwuchs communities and perhaps can be used in estuarine water quality assess-ments. A second major advance was the demonstration of information processing in food web transformations. The report includes material that are part of 18 published or submitted manuscripts. Synopses of these papers are included. (Katz) W75-06383

MARINE RADIOECOLOGY: A SELECTED BIBLIOGRAPHY OF NON-RUSSIAN LITERA-

Environmental Protection Agency, Boise, Idaho. E. Edmundson, Jr., V. Schultz, and A. W. Klement, Jr. 1974. 52 p.

Descriptors: *Reviews, *Bibliographies, Radioecology, *Sea water, Radioactivity effects, *Marine biology, Water pollution effects. Identifiers: *Marine radioecology.

References to the literature available on the subject of marine radioecology are found in this bibliography. Reports of laboratory and field stuare included as were those of salt and brackish water and anadromous and catadromous species. Bibliographies are also listed. (Katz) W75-06384

A REVIEW OF THE LITERATURE ON THE USE OF DIURON IN FISHERIES.

Bureau of Sport Fisheries and Wildlife, Columbia, Mo. Fish-Pesticide Research Lab. W. W. Johnson, and A. M. Julin.

Available from the National Technical Informa-tion Service, Springfield, Va 22161 as PB-235 446, \$5.25 in paper copy, \$2.25 in microfiche. July 1974. 81 p, 2 tab, 27 ref.

Descriptors: "Herbicides, "Aquatic weed control, "Aquiculture, "Reviews, Bibliographies, Algae, Pesticides, Algicides, Metabolism, Mode of Action, Photosynthesis, Pesticide residues, Analytical techniques, Toxicity, Fish, Water pollution effects."

Identifiers: *Diuron, Karmex(R)

Diuron is a major phenylurea herbicide produced by duPont. It was introduced experimentally in 1951, registered for industrial weed control in 1953 under the trade name 'Karmex', and for agricul-tural use in 1954. It has been extensively studied and used in aquatic environments. Diuron shows good potential as a broad-spectrum, aquatic herbicide as it controls most algal species and many vascular hydrophytes. Factors affecting the efficavascular hydrophytes. Factors affecting the effica-cy of diuron include light, temperature and water quality. It is also strongly adsorbed by organic matter and some clays. Diuron acts primarily on the light reaction of photosynthesis by strongly inhibiting the 'Hill reaction'. It is persistent in the aquatic environment and evidence indicates that low levels of accumulation may occur in non-target organisms so that chronic effects may be sig-nificant. A review of the literature on the use of diuron in fisheries is presented. (Katz)

A REVIEW OF THE LITERATURE ON THE USE OF SQUOXIN IN FISHERIES, Bureau of Sport Fisheries and Wildlife, Cook,

Wash. Western Fish Nutrition Lab.

G. J. Crowley.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 456, \$3.75 in paper copy, \$2.25 in microfiche. March 1974. 24 p, 3 tab, 37 ref.

Descriptors: *Piscidides, *Aquiculture, Selectivity, Sport fish, *Pest control, Freshwater fishes, *Reviews, Bibliographies, Water pollution effects, Salmonids, Chemical analysis, Bioassay, Toxicity, Laboratory tests, Pesticide residues, Mode of Action

Identifiers: *Squoxin, *Squawfish, Ptychocheilus oregonensis, Ptychocheilus umpqua.

The piscicide Squoxin is highly selective against two species of squawfish, Ptychocheilus oregonensis and P. umpqua. Extensive field testing in Idaho and Oregon has demonstrated the effectiveness of the chemical in controlling squawfish while not harming sympatric fish species, especially salmonids, and invertebrates. The use of Squoxin as an invention to promote fish culture by squawfish population eradication has been patented in the United States and Canada. The compound is not yet registered. However, efforts toward this end are under way as part of the Squoxin Development Project. Collaborators in this project are presently compiling available in-formation for application to Environmental Protection Agency, anticipated in early 1974. Literature concerning the use of Squoxin in fisheries is reviewed. (Katz)
W75-06386

A REVIEW OF THE LITERATURE ON THE USE OF COPPER SULFATE IN FISHERIES, Bureau of Sport Fisheries and Wildlife, Marion,

Ala. Southeastern Fish Cultural Lab G. A. Jackson.

Available from the National Technical Informa tion Service, Springfield, Va 22161 as PB-235 445, \$4.75 in paper copy, \$2.25 in microfiche. March 1974. 91 p, 2 tab, 216 ref.

sulfate, *Algiculture, *Aquiculture, Descriptors: *Copper sulfate, *Algicides, *Pesticides, *Reviews, *Aquiculture, Bibliographies, Pest control, Piscicides, Toxicity, Mode of Action, Water quality, Water pollution

Copper sulfate is currently registered by the Environmental Protection Agency as an algicide and has been given a tolerance of 1.0 ppm in potable waters. This chemical is commonly employed for other aquatic purposes such as a therapeutant, piscicide and molluscicide and future clearance of copper sulfate for these applications is dependent on a thorough evaluation of its efficacy on target species and its toxicity to non-target organisms. In the past, failure to recognize variations in water quality, especially water hardness and alkalinity, has often resulted in undesirable consequences. When properly administered, however, with a full consideration of the various water quality parameters and biota present, copper sulfate is one of the most efficient and versatile chemicals available to the aquatic biologist. The literature concerning copper sulfate's use in fisheries is reviewed. (Katz) W75-06387

A REVIEW OF THE LITERATURE ON THE USE OF ROTENONE IN FISHERIES, Bureau of Sport Fisheries and Wildlife, LaCrosse,

Wis. Fish Control Lab.

R. A. Schnick. Available from the National Technical Informastion Service, Springfield, Va 22161 as PB-235 454, \$4.25 in paper copy, \$2.25 in microfiche. May 1974. 130 p, 3 tab, 315 ref. Descriptors: *Reviews, *Rotenone, *Fish control agents, *Pest control, *Piscicides, *Bibliographies, Pesticides, Freshwater fish, Aquiculture, Fish management, Regulation, Tox-Water pollution effects, Organic compounds. Identifiers: Fishery reclamation, Noxfish(R), Pro-

Noxfish(R), Chem-Fish(R).

Rotenone has been used for 40 years as a piscicide in the United States and Canada. It is effective in low concentrations (0.05 to 2 mg/l of the commercial formulations) against most life stages of many species of freshwater and marine fishes, but with a range of specificity among species. Other desirable characteristics of rotenone include less persistence in water than organochlorine pesticides, low toxicity to birds and mammals, and rapid toxicity to fish. If needed, it can be detoxified easily by potassium permanganate or chlorine and removed by activated carbon. The activity of rotenone is limited by high pH, hardness, alkalinity, and low temperatures. Several methods are available for determining the amount of rotenone in the water, milk, plants, and fish. Twenty degradation products have been observed after rotenone was exposed to light; this observation may pose a problem in the tolerance registration of notenone. A review is presented of the literature concerning rotenone's use in fisheries. (Katz) W75-06388

A REVIEW OF THE LITERATURE ON THE USE OF ENDOTHALL IN FISHERIES Bureau of Sport Fisheries and Wildlife, Denver,

Colo. Fish Pesticide Research Lab

J. G. Armstrong.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 447, \$3.25 in paper copy, \$2.25 in microfiche. March 1974. 22 p, I tab, 26 ref.

Descriptors: *Herbicides, *Pest control, *Aquiculture, *Algicides, *Reviews, Aquatic weed control, Fish, Fisheries, Toxicity, Chemical degradation, Water pollution effects.

Identifiers: *Endothall.

Endothall is an organic contact herbicide and algicide used in lakes and ponds. It is used on terrestri-al seed crops as a pre-harvest desiccant and is registered for use as a pre- and post-emergent herbi-cide. It is registered for use in lakes and ponds as a herbicide and algicide. It is of value to those con-cerned with a fishery because it does not persist in the environment and the levels required to control aquatic vegetation do not seem to be harmful to either fishes or fish-food organisms. It is relatively safe to the applicator and economical. A control program, using endothall would be both ethical and defensible. Literature concerning Endothall's use in fisheries is reviewed. (Katz) W75-06389

A REVIEW OF THE LITERATURE ON THE

USE OF MASOTEN IN FISHERIES, Bureau of Sport Fisheries and Wildlife, Stuttgart, Ark. Fish Farming Experiment Station. J. E. Ellis.

Available from the National Technical Informaston Service, Springfield, Va 22161 as PB-235 453, \$4.25 in paper copy, \$2.25 in microfiche. (March 1974). 62 p, 102 ref.

Descriptors: *Reviews, *Pesticides, *Aquiculture, Descriptors: *Reviews, *Pesuciues, Alexanders, *Pereshwater fish, *Organophosphorus pesticides, *Impounded, Impounded Organophosphorus waters, Parasites, Toxicity, Bibliographies, Water pollution effects.
Identifiers: *Trichlorofon, *Masoten(R). Parasiticide

Trichlorfon is the common name of the active ingredient in Masoten (R). It is an organic phosphate parasiticide originated by Bayer AG in Germany and developed by Chemagro in the United States.

Effects Of Pollution—Group 5C

Its first use in fisheries was to control ectoparasites. It was recently registered under the trade name Masoten for use in impounded waters (aquariums and ponds) for fish not used as food (goldfish and bait fish). It is an effective therapeutant for the control of anchorworms Lernaea sp., fish lice Argulus sp., and gill flukes Cleidodiscus sp., Dactylogyrus sp., and Gyrodactylus sp. In Europe it is approved for use on the same target organisms including treatment of food fish such as carp, eel, and trout. Literature concerning Masoten's use in fisheries is reviewed. (Katz) W75-06390

A REVIEW OF THE LITERATURE ON THE USE OF LIME (CA(OH)2, CAO, CACO3) IN FISHERIES,

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Bureau of Sport Fisheries and Wildlife, Warm Springs, Ga. Southeastern Fish Control Lab.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 449, \$3.75 in paper copy, \$2.25 in microfiche. February 1974. 30 p, 53 ref.

Descriptors: *Calcium compounds, *Lime, *Aquiculture, *Reviews, *Pesticides, Bibliographies, Calcium carbonate, Ponds, Fish farming, Fish parasites, Fisheries, Water pollution effects. Identifiers: Calcium hydrate, Pond care.

The literature concerning lime's use in fisheries is reviewed. Liming is a form of multi-purpose pond care. Properly applied, lime kills free swimming and bottom dwelling organisms that are harmful to fish, produces a favorable pH in acid waters and increases the alkaline reserve in water and mud which buffers against extreme changes in pH. Lime is considered to be a relatively safe industrial chemical and since it is generally recognized as a safe food ingredient by the U.S. Food and Drug Administration, its use in fish ponds should cause little concern to regulatory agencies. (Katz) W75-06391

A REVIEW OF THE LITERATURE ON THE USE OF BETADINE IN FISHERIES,

Bureau of Sport Fisheries and Wildlife, Seattle, Wash. Western Fish Disease Lab.

N. C. Nelson. Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 443, \$3.75 in paper copy, \$2.25 in microfiche. March 1974. 48 p, 2 tab, 71 ref.

Descriptors: "Reviews, "Aquiculture, "Pesticides, *Fish eggs, "Toxicity, Bibliographies, Freshwater fishes, Fish diseases, Pest control, Bactericides, Salmon, Trout, Pathogenic bacteria, Fungi, Water quality, Water pollution effects. Identifiers: "Betadine.

Many bacterial and viral fish diseases can be transmitted on eggs from carrier brood fish. In 1969, Betadine (providone-iodine), a non-selective organic iodine germicide, was found to be an effective egg surface disinfectant. This literature review was written to support FDA registration for Betadine Solution on food fish eggs. It is virucidal and bactericidal to common fish pathogens at levels which are non-toxic to salmonid eggs. The effectiveness and safety of Betadine Solution make it a likely candidate for successful registration. (Katz)

A REVIEW OF THE LITERATURE ON THE USE OF FORMALIN-MALACHITE GREEN IN FISHERIES.

Bureau of Sport Fisheries and Wildlife, Seattle, Wash. Western Fish Disease Lab. N. C. Nelson.

March 1974. 31 p, 2 tab, 42 ref.

Descriptors: *Reviews, *Aquiculture, *Fish parasites, *Pesticides, Toxicity, Freshwater fish, Fish diseases, Pest control, Water pollution effects. Identifiers: *Formalin, *Malachite green.

This literature review was written to support initiation of FDA registration procedures for use of the formalin-malachite green mixture as a therapeutant in fish culture. This mixture of chemicals is used to treat external parasites, particularly lethyophthirius, of coldwater and warmwater fishes. It is a very effective medicament with a lower toxicity than that of either chemical used individually, but additional data on toxicity to nontarget organisms will probably have to be gathered before registration can be obtained. (Katz)

A REVIEW OF THE LITERATURE ON THE USE OF MALACHITE GREEN IN FISHERIES, Bureau of Sport Fisheries and Wildlife, Seattle,

Bureau of Sport Fisheries and Wildlife, Seattl Wash. Western Fish Disease Lab.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 450, \$4.75 in paper copy, \$2.25 in microfiche. March 1974. 79 p, 5 tab, 124 ref.

Descriptors: *Fungicide, *Pesticides, *Reviews, *Fish diseases, Bibliographies, Fish eggs, Fish hatcheries, Pest control, Toxicity, Fish parasites, Aquiculture, Mode of Action, Water pollution effects.

Identifiers: *Malachite green.

Malachite green is used extensively in fish hatcheries as a fungicide on both eggs and fish, and is also effective against certain external protozoan and bacterial infections. It can be applied as an aqueous solution in tanks, troughs, raceways, and ponds for fixed or extended treatment, used as a dip, or applied topically. At present, malachite green is not registered with the FDA for use on food fishes. Since it has been implicated as a mutagen, carcinogen and teratogen, safety will have to be demonstrated before registration is possible. This literature review was written as the first step in the drug clearance process. (Katz)

INTERACTION OF SELECTED PESTICIDES WITH MARINE MICROORGANISMS,

Syracuse University Research Corp., N.Y. H. C. Sikka, and C. P. Rice.

Available from the National Technical Information Service, Springfield, Va 22161 as AD-785 079, \$4.75 in paper copy, \$2.25 in microfiche. Office of Naval Research, Final Report, September 1974. 76 p, 7 fig, 15 tab, 52 ref.

Descriptors: *Chlorinated hydrocarbon pesticides, *Marine algae, *DDT, *Dieldrin, *Environmental effects, DDE, Growth rates, Photosynthesis, Metabolism, Laboratory tests, Bacteria, Fungi, Primary productivity, Inhibitors, Toxicity, Water pollution effects.

Identifiers: *Bioaccumulation, Methoxychlor, Carbaryl, I-Naphthol.

The effects of some persistent chlorinated hydrocarbon pesticides on six species of marine algae were tested. Carbaryl and l-naphthol, a degradation product, were investigated in terms of uptake, metabolism, growth and photosynthesis by the algae. Uptake and metabolism of dieldrin, DDT and methoxychlor by the six species of algae were examined. Dieldrin, DDT and methoxychlor were concentrated by the algae to levels much higher than the original concentration in the medium. Growth was inhibited, to differing degrees, by methoxychlor, carbaryl and l-naphthol. (Katz) W75-6036

AEROBIC DIGESTION OF EXTRACELLULAR MICROBIAL POLYSACCARIDES,

Oklahoma State Univ., Stillwater. Bioenvironmen tat Engineering Labs. For primary bibliographic entry see Field 5D. W75-06405

SOURCES OF POTENTIAL BIOLOGICAL DAMAGE FROM ONCE-THROUGH COOLING SYSTEMS OF NUCLEAR POWER PLANTS, Oak Ridge National Lab., Tenn. For primary bibliographic entry see Field 5B. W75-06415

FISH PARASITES OCCURRING IN THIRTEEN SOUTHERN CALIFORNIA RESERVOIRS, California State Univ., San Diego,

California State Univ., San Diego. For primary bibliographic entry see Field 8I. W75-06416

DRAFT ENVIRONMENTAL STATEMENT HTGR FUEL REFABRICATION PILOT PLANT AT THE OAK RIDGE NATIONAL LABORATORY.

Oak Ridge National Lab., Tenn. For primary bibliographic entry see Field 5B. W75-06417

A COMPILATION OF AUSTRALIAN WATER QUALITY CRITERIA,

Caulfield Inst. of Tech., (Australia).
For primary bibliographic entry see Field 5G.
W75-06418

EFFECTS OF SELECTED HERBICIDES ON BACTERIAL POPULATIONS IN FRESH AND TREATED WATER,

TREATED WATER, Clemson Univ., S.C. Dept. of Botany. N. D. Camper, and J. M. Shively. Available from the National Technical Informa-

Available from the National Technical Information, Service, Springfield, Va 22161 as PB-240 972, \$3.25 in paper copy, \$2.25 in microfiche. South Carolina Water Resources Research Institute, Clemson, Report No. 49, November 1974. 10 p, 1 fig, 3 tab, 4 ref. S-047-SC.

Descriptors: *Herbicides, Degradation(Decomposition), Microorganisms, Water pollution effects, Eutrophication, *Bacteria, Lakes, Ponds, Diquat Identifiers: Diuron, Dichlobenil.

Bacterial populations in untreated and herbicidetreated waters were subjected to three different herbicides. Diuron, dichlobenil, and diquat were added (100 mg/1) to water samples from two fresh water lakes and two herbicide-treated ponds. Total numbers of bacteria were monitored. Bacterial populations in fresh lake water decreased initially after herbicide additions; however, final populations were significantly greater than the controls. Similar observations were recorded for bacteria in dichlobenil- and diuron-treated water. Selective enrichment is implicated by the results of these experiments. W75-06432

POPULATION DYNAMICS OF HUNTERELLA NODULOSA (CESTOIDEA:CARYOPHYLLIDEA) IN AL-

BERTA, Calgary Univ. (Alberta). Dept. of Biology. For primary bibliographic entry see Field 8I. W75-06465

THE EFFECTS OF PCB'S AND SELECTED HERBICIDES ON THE BIOLOGY AND GROWTH OF PLATYMONAS SUBCORDIFORMIS AND OTHER ALGAE,

Maine Univ., Orono. Dept. of Botany and Plant Pathology.
R. L. Vadas.

Group 5C-Effects Of Pollution

Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 056, \$3.75 in paper copy, \$2.25 in microfiche. Report 2-74 Environmental Studies Center, University of Maine, Orono, (1974). 35 p, 8 fig, 4 tab, 27 ref. OWRT A-027-ME(1).

*Polychlorinated biphenyls, Descriptors: *Herbicides, Water pollution effects, *Algae, *Growth rates, *Carrying capacity, Inhibition, Organophosphorus pesticides, Chlorinated hydrocar-

ganophospino. bon pesticides. *Playtomonas subcordiformis. Aroclor 1254, Organophosphates, Malathion, Algal growth.

Growth rates and carrying capacities for Platymonas subcordiformis were determined using various concentrations of the PCB, Aroclor 1254, and the Organophosphate, Malathion. Growth was slightly and completely inhibited by 100 and 1000 ppb respectively of Aroclor 1254. With Malathion growth inhibition was temporary or complete at 50 ppm or greater. At alkaline pH's the recovery of growth, especially at 50 ppm, took 3 to 5 days. At higher concentrations of Malathion, recovery took longer if occurring at all. The inhibitory effects of Malathion, Aroclor, and chlorinated hydrocarbons are modified by inoculum densities, phase of algal growth at which the substance is added and in the case of the former possibly by the pH of the W75-06518

HEAVY METALS IN CULTIVATED OYSTERS (CRASSOSTREA COMMERCIALIS = SACCOS-TREA CUCULLATA) FROM THE ESTUARIES OF NEW SOUTH WALES (AUSTRALIA), Chief Secretary's Dept., Sydney (Australia). New South Wales Fisheries Branch. For primary bibliographic entry see Field 5B. W75-06552

FUNDAMENTALS OF AQUATIC BIOASSAYS. Ministry for Conservation, Melbourne (Australia). Westernport Bay Environmental Study. For primary bibliographic entry see Field 5A. W75-06554

ECOLOGICAL EFFECTS OF NUCLEAR STEAM ELECTRIC STATION OPERATIONS ON ESTUARINE SYSTEMS.

Maryland Univ., Prince Frederick. Center for Environmental and Estuarine Research. Available from the NTIS, Springfield, Va 22161 as Rept. No. ORO-4328-3, \$10.60 in paper copy, \$2.25 in microfiche. Report No. ORO-4382-2, June 1974. 359 p, 100 fig, 61 tab, 72 ref.

*Chesapeake Descriptors: *Maryland. "Nuclear power plants, "Environmental effects, "Eccosystems, "Estuarine environment, Opera-tions, Investigations, Surveys, Sampling, Pollutions, investigations, Surveys, Samping, Politicatant identification, Radioactivity, Thermal pollution, Data collections, Biota, Water quality, Radiochemical analysis, Metals, Aquatic animals, Plankton, Benthic fauna, Sediments.

Identifiers: *Calvert Cliffs Site(Md).

This is the third progress report dealing with studies pertaining to a segment of the estuarine environment located at the western shore zone of the Chesapeake Bay in Calvert County, Maryland. The investigations, which are basically field oriented, began in 1971. The first objective, 'to obtain adequate pre-operational base line environ-mental and biotic data in order to characterize an estuarine area which is to be used as a nuclear steam electric station site, has remained as the primary objective during this pre-operational phase. Ojbective No. 2 is as follows: 'to determine phase. Operation of a storiows. The technique the effects of a nuclear S.E.S. operation on an estuarine environment and associated biota by appropriate post-operational field studies. This latter objective is scheduled to be met during the

second phase of the work when the nuclear S.E.S. becomes operational. Estimates for start-up of unit No. 1 range from September 1974 to January 1975 which will allow at least three years of continuous sampling before any S.E.S. induced changes occur. (See W75-06622 thru W75-06629). (Houser-ORNL) W75-06621

ANALYSIS OF CALVERT CLIFFS REFERENCE STATION MEASUREMENTS (TEMPERATURE, SALINITY, AND DISSOLVED OXYGEN), Martin Marietta Labs., Baltimore, Md. For primary bibliographic entry see Field 5B.

RADIOCHEMISTRY-GAMMA ANALYSIS: CALVERT CLIFFS SEDIMENT RADIOACTIVI-TIES BEFORE AND AFTER TROPICAL STORM

National Aeronautics and Space Administration, Washington, D.C. Planatology Branch. For primary bibliographic entry see Field 5B.

PHYTOPLANKTON: CONTINUING STUDIES ON PRIMARY PRODUCTIVITY AND STAND-ING CROP OF PHYTOPLANKTON AT CAL-VERT CLIFFS, CHESAPEAKE BAY, Maryland Univ., Prince Frederick. Center for Environmental and Estuarine Research.

D. A. Flemer, and L. W. Beaven. In: Report No. ORO-4328-3, p V-1 - V-102, June 1974. 7 fig, 6 tab, 24 ref.

Descriptors: *Maryland, *Monitoring, Environment, Sites, Nuclear power plants, *Phytoplankton, *Aquatic plants, *Chesapeake Bay, Absorption, Carbon radioisotopes, Chlorophyll, Nitrogen, Sampling, Crop production, Standing crops, Analytical techniques, Organic matter, Carbon, Dissolved solids, Cruises, Ships, Grazing.
Identifiers: *Calvert Cliffs Site(Md).

Field data on primary productivity and the standing crop of phytoplankton of Calvert Cliffs from September 1971 to May 1974 are summarized. Three months data are lacking to complete a third annual cycle. A descriptive overview is presented of the material in hand and a statistical analysis is proposed for a later time. Some statistical in-terpretations are available on the combined sampling and analytical error for several factors. Data pling and analytical error for several factors. Data presented include: 14C-uptake by phytoplankton, chlorophyll a, particulate carbon (PC), particulate nitrogen (PN), and dissolved organic carbon (DOC). Several experiments were conducted in an effort to determine whether grazing substantially affects the outcome of sample incubation in light and dark bottles using the 14C-uptake procedure. A specific diel study was conducted in November 1973 to determine if grazing was measurable at the 1973 to determine if grazing was measurable at the level of primary productivity and phytoplanktonic standing crop. (See also W75-06621) (Houser-ORNL)

ZOOPLANKTON: PROGRESS REPORT TO THE U.S. ATOMIC ENERGY COMMISSION ZOOPLANKTON STUDIES AT CLIFFS, Maryland Univ., Prince Frederick. Natural

Resources Inst. D. R. Heinle, and H. S. Millsaps. In: Report No. ORO-4328-3, p VI-1 - VI-14, June

1974. 6 fig, 1 tab, 8 ref.

Descriptors: *Maryland, *Surveys, Aquatic environment, *Zooplankton, *Copepods, *Chesapeake Bay, *Environmental effects, vironment, *Zooplankton, *Copepods, *Chesapeake Bay, *Environmental effects, *Nuclear powerplants, Effluents, Data collections, Distribution, Census, Fluorescence, Chlorophyll. Identifiers: *Calvert Cliffs Site(Md).

rateniness of Zooplankton was determined by sampling a crossed pattern with a plankton pump in Chesapeake Bay near Calvert Cliffs. Relative fluorescence of chlorophyll was measured to correlate changes in fluorescence with changes in zooplankton densities. Coefficients were calculated for each species along each transect based on total counts. Data collected are reported. (See also W75-06621) (Houser-ORNL) W75-06625 Patchiness of Zooplankton was determined by

EFFECT OF TROPICAL STORM AGNES ON STANDING CROPS AND AGE STRUCTURE OF ZOOPLANKTON IN MIDDLE CHESAPEAKE BAY, Maryland Univ., Prince Frederick. Natural

Resources Inst.

D. R. Heinle, H. S. Millsaps, and C. V. Millsaps. In: Report No. ORO-4328-3, p VI-15 - VI-41, June 1974. 12 fig, 7 ref.

Descriptors: *Maryland, *Surveys, Aquatic environment, *Zooplankton, *Chesapeake Bay, *Tropical cyclones, Environmental effects, *Standing crops. Aging(Physical), Durability, Storms, Damages, Data collections, Speciation, Seasonal, Salinity, Copepods.
Identifiers: *Calvert Cliffs(Md), *Tropical storm

General magnitude of densities and the age structures of populations of dominant summer species, tures or populations of dominant summer species, particularly Acartia tonsa, were not affected by 'Agnes'. Salinities at mid-Bay did not drop below the range tolerated by A. tonsa. Species with requirements for higher salinities, e.g., Olthona brevicornis, disappeared after 'Agnes'. They were detected again in late August or early September but failed to achieve densities recorded in other years. (See also W75-06621) (Houser-ORNL) W75-06626

MEROPLANKTON, Maryland Univ., Prince Frederick. Center for En-vironmental and Estuarine Studies. L. Lubbers, J. E. Cooper, and J. A. Mihursky. In: Report No. ORO-4328-3, p VII-1 - VII-24, June 1974. 2 fig. 15 tab. 5 ref.

Descriptors: *Maryland, *Environmental effects, *Surveys, *Census, Sites, *Chesapeake Bay, Aquatic animals, Fish, Larvae, Life cycles, Distribution, Population, Animal population, Aquatic population, Nuclear power plant, Effluents. Identifiers: *Meroplankton, Eggs, *Calvert Cliffs Site(Md)

Report covers 29 regular sampling dates over a 20 month period which is somewhat longer than the previous report, 22 dates in 13 months. Similar trends in distribution and relative abundance do occur although total numbers of organisms found in this study period are considerably less. Greatest numbers of eggs and larvae appear in the warmer months. During the winter months, however, the months. During the winter months, however, the highest concentration of larvae are found in the deeper zones, the same zones scheduled as the source of condenser water supply for the Steam Electric Station. The Calvert Cliffs plant is expected to use 2.4 million gallons of water per minute. The volume of water within the study segment is 3.5 x 10(8) cu m. It would take about .7 days for the S.E.S. to pump that volume of water. A table presents the total number of fish care and days for the S.E.S. to pump that volume of water.

A table presents the total number of fish eggs and larvae expected in that water mass each month based on averages from the fish eggs and larvae collections between 1971 and 1974. (See also W75-06621) (Houser-ORNL) W75-06627

BENTHIC ANIMAL-SEDIMENT, Maryland Univ., Prince Frederick. Center for En-vironmental and Estuarine Studies. N. K. Mountford, P. E. Prere, and J. A. Mihursky. In: Report No. ORO-4328-3, p VIII-1 -VIII-112, June 1964. 64 fig, 31 tab, 20 ref.

Effects Of Pollution—Group 5C

Descriptors: *Maryland, *Surveys, Aquatic environment, *Chesapeake Bay, *Water pollution, vironment, "Chesapeake Bay, "Water Poliution, Sites, Nuclear power plants, Effluents, "Environmental effects, Aquatic animals, Temperature, "Sediments, Salinity, Benthic fauna, Bjomass, Hydrography, Depth, Size, Speciation. Identifiers: "Calvert Cliffs Site(Md).

Data are reported from a benthic animal-sediment study. Some benthic data from other studies are included for comparison as the end of the third year approaches for pre-operative data collection. The major future comparison will be between the present pre-operational and future post-operational data obtained after the Calvert Cliffs Nuclear Steam Electric Station is under operation with both the first and eventually the second unit on line. Information is presented on the (1) Hydrographic data, (2) Benthic infauna data, and (3) Comparison of data by location. (See also W75-06621) (Houser-ORNL)

BENTHIC-HEAVY METALS, Federal City Coll., Washington, D.C. H. Phelps. In: Rept. No. ORO-4328-3, p IX-1 - IX-11, June 1974. 5 fig, 1 tab, 5 ref.

Descriptors: *Maryland, *Surveys, *Heavy metals, *Chesapeake Bay, Water pollution sources, *Nuclear powerplants, Effluents, Copper, Cadmium, Zinc, Lead, Nickel, Sedi-ments, Aquatic life, Sediment load, Absorption, Environmental effect.
Identifiers: *Calvert Cliffs Site(Md.).

The purpose of this study is to determine whether any changes in concentrations of heavy metals, specifically copper, cadmium, zinc, lead, and nickel, will occur in sediments and benthic organisms near the Calvert Cliffs Nuclear Powerplant. A pre- and post-plant operative sampling design is scheduled. Plant operations were tentatively scheduled to start towards the end of 1974. Laboratory work has centered on the metal loading capacity of the sediments which are reported here. The methods and procedures are given for sampling and analysis. (See also W75-06621) (Houser-ORNL)

AMMONIA EXCRETION BY ZOOPLANKTON AND ITS SIGNIFICANCE TO PRIMARY PRODUCTIVITY DURING SUMMER,

Washington Univ., Seattle. Dept. of Oceanography. M. Jawed.

Mar Biol (Berl) Vol 23, No 2, p 115-120, 1973.

Identifiers: *Ammonia, Columbia River, Diffusion, Excretion, Jellyfishes, Plankton, Plumes, *Primary productivity, Rivers, Summer, *Zoo plankton, Oregon, Washington.

Excretion rates of ammonia were determined for zooplankton off the coasts of Washington and Oregon. Rates varied from 0.16-0.60 microgramatoms NH4+-N/mg dry weight/day for most planktonic animals and from 0.02-0.06 for jellyfishes. Ammonia concentration in seawater was low in offshore regions. Ammonia released by zooplankton was studied in relation to primary productivity during summer. In the Columbia River plume offshore, excreted ammonia con-tributed about 90% of the total N requirements of observed production rates. The ammonia-N contribution was 36% in oceanic waters and was relatively unimportant in the inshore region. The siginficance of eddy diffusivity in offshore waters and upwelling in inshore waters is also discussed.—Copyright 1974, Biological Abstracts, Inc. W75-06637 **FACTORS LIMITING PRIMARY PRODUCTIVI-**TY IN TURBID KANSAS RESERVOIRS,

Kansas Water Resources Research Inst., Manhat-

W. J. O'Brien.

Available from the National Technical Information Service, Springfield, Va 22161, as PB-241 135, \$3.75 in paper copy, \$2.25 in microfiche. KWRRI Contribution No 156, January 1975. 34 p, 11 fig, 2 tab, 29 ref, append. OWRT A-052-KAN(1), 14-31-0001-3516.

Descriptors: *Turbidity, *Limiting factors, *Phosphorus, Phytoplankton, Reservoirs, Primary Descriptors: productivity, Thermal stratification, Lakes, Water pollution effects, *Kansas, *Nutrient requirements, *Light penetration, *Mixing. Identifiers: *Reservoir morphometry

To learn more about the nature of eastern Kansas lakes, four reservoirs, varying in size from 175 acres to 12,200 acres, were studied over a 2-year period. Measurements taken at each lake included temperature, light intensity, nutrient and oxygen concentration, pH, alkalinity, primary productivi-ty and a nutrient limitation bioassay. Use of the common carbon-14 technique for assaying nutrient limitation revealed the existence of a previously unrecognized lag between the addition of the added limiting nutrient and the response of in-creased carbon uptake. This technique was carefully documented while a modified laboratory bioassay was employed in the study of nutrient limitation of the lakes. Two distinct types of reservoirs occur in eastern Kansas; smaller lakes thermally stratify during the warmer months while the larger reservoirs only occasionally do so. Those reservoirs which stratify were found to have lower turbidity and lower dissolved nutrients than did the generally unstratified lakes where mixing to the bottom occurs throughout the summer. In phytoplankton growth the turbidity and complete mixing to the bottom were found to be quite critical. The results suggest that phosphorus additions to large reservoirs may not be as critical as in more northern areas. Nutrient additions to either type of lake are likely to be ineffective in promoting in-creased fish production because increased plant production simply falls to the lower oxygen area of these lakes. Recreational value of future reservoirs could be increased with greater emphasis on the size, depth and configuration of the basin. W75-06642

DECOMPOSITION OF FOUR SPECIES OF LEAF MATERIAL IN THREE REPLICATE STREAMS WITH DIFFERENT NITRATE INPUT, Oregon State Univ., Corvallis. Dept. of Fisheries

For primary bibliographic entry see Field 5B. W75-06649

PHYTOPLANKTON OF THE WESTE (KURTLI) POND IN 1967-1970 (IN RUSSIAN), Acad. Sci. Turkm. SSR, Ashkhabad, Inst. Bot. Sh. I. Kogan, and L. V. Kudimova. Izv Akad Nauk Turkm SSR Ser Biol Nauk. 3. p 12-

Izv Akad Nauk Turkin GGR GC. 20, 1973, Illus. (English summary). Identifiers: Algae, *Phytoplankton, Ponds, Identifiers: Algae, *Phytoplankton *USSR(Western Kurtli), *Cyanophyta.

Algal species, varieties and forms (238) have been recorded in the phytoplankton (at this USSR locality) in the process of investigations. The increase has been established of the number and importance of blue-green algae during the investigated years.--Copyright 1974, Biological Abstracts, Inc. W75-06653

EVALUATION OF METHODS FOR DETECTING COLIFORMS AND FECAL STREPTOCOCCI IN CHLORINATED SEWAGE EFFLUENTS, Illinois State Water Survey, Urbana.

For primary bibliographic entry see Field 5A.

ON THE USE OF INDICATOR COMMUNITIES OF TUBIFICIDAE AND SOME LUMBRICU-LIDAE IN THE ASSESSMENT OF WATER POL-LUTION IN SWEDISH LAKES,

Uppsala Univ. (Sweden). Inst. of Zoology. Zoon. Vol 1, No 2, p 125-139, 1973, Illus.

Descriptors: *Water pollution, *Water pollution effects, Eutrophication, Lakes, Aquatic life, Tubificids, Europe. Identifiers: Chaetae, Lumbriculidae, Tubifex-tubifex, Tubificidae, *Sweden.

Ecological details from all available sources on the subject are summarized for ecologically important aquatic oligochaetes. Tubificidae (22 spp.) and 2 Lumbriculidae recorded from Swedish lakes are treated in order of tolerance to different degrees of eutrophication. The different species are placed in the specific communities in which they are generally found in those lakes. It is the specific composition of tolerant and sensitive species in a community which has an indicator value. The ecological demands of Tubifex tubifex are especially discussed partly because several other tu-bificids with hair chaetae used to be classified as T. tubifex-and thus some ecological reports must be considered dubious-and partly because the species is generally found in both the most polluted Swedish waters and in the cleanest, which is unique among tubificid species in Sweden.--Copyright 1974, Biological Abstracts, Inc.

PHYTOPLANKTON OF THE LOWER IRTYSH IN JULY, 1968, (IN UKRAINIAN), Tyumenskii Gosudarstvennyi Meditsinskii Institut

(USSR). Dept. of Biology. Y. I. Yurova

Ukr Bot Zh. Vol 30, No 3, p 385-386, 1973, English

Identifiers: Algae, Melosira-distans, Melosira-italica-ssp-subarctica, *Phytoplankton, *USSR(Lower Irtysh), *Cyanophyta, Eutrophica-

A description is presented of phytoplankton of the lower Irtysh (USSR) on the basis of processing samples taken in July, 1968. The character of the lower Irtysh phytoplankton is found to be similar to that of the middle reaches. A blue-green algae bloom was observed which was not observed in the middle reaches and the presence of some forms (Melosira italica spp. subarctica M. distans var. alpigena and others) not found in the middle var. appens and Otters) not todan in the indexer-reaches are 2 differences noted. In all, 95 spp. represented were detected.—Copyright 1974, Biological Abstracts, Inc. W75-06700

COMPARATIVE STUDY OF THE NITROGEN LIFE-CYCLE IN THE PONDS (IN FRENCH).

Station d'Hydrobiologie Continentale, Biarritz (France). M. Laurent, and J. Badia.

Ann Hydrobiol. Vol 4, No 1, p 77-102, 1973, Illus, English summary.

Descriptors: *Ponds, Ecology, Bacteria, *Nitrogen, *Nitrogen compounds, Mathematical analysis, Muds, Nitrification, Ammonification. Identifiers: Heterotrophic nitrification

A comparative study of 2 ponds under very different ecological conditions was carried out: physico-chemical measures, counting of bacteria in mud and in water during an annual cycle; N and nitrogenous compounds were particularly studied. The interpretation of results in worked out by classical graphic analysis and of mathematical analysis (factor analysis and principal component analysis,

Group 5C-Effects Of Pollution

factor analysis of correspondances and harmonic analysis). The opposition between the temperature and the number of ammonifying germs on one hand and the ammoniacal N content on the other hand is pointed out. The existence of heterotrophic nitrification in muds is suggested. The mathematical analysis allows a much finer interpretation of data than the classical analysis, for showing the opposition between ammonifying germs and ammoniacal nitrogen as well as for heterotrophic nitrification; it seems necessary for studying seasonal variations of ecological factors in natural environments.—Copyright 1974, Biological Abstracts, Inc. W75-06702

DIURNAL VARIATION IN SAGAR LAKE, SAGAR (INDIA): I. STUDIES IN THE DEEP WATER AREA, Saugar Univ., Sagar (India). Dept. of Botany.

Saugar Univ., Sagar (India). Dept. of Botany. S. B. Saksena, and A. D. Adoni. Hydrobiologia. Vol 43, No 3/4, p 535-543, 1973,

Descriptors: *Lakes, Asia, Freshwater, Plankton, *Chemical properties, Chlorides, Carbonates, Oxygen, Crustaceans, Rotifers, Microorganisms, Diurnal.

Identifiers: *India(Sagar Lake), Microcystis, Trachelomonas.

A diurnal study of an inland freshwater lake was made with respect to physical and chemical properties and of the plankton. Chlorides have followed the total carbonates while dissolved O2 and pH have shown no relationship. Microcystis has followed no definite pattern of diurnal movement. All crustaceans, some of the rotifers and Trachelomonas perform considerable diurnal movement in the course of a 24 h period.—Copyright 1974, Biological Abstracts, Inc. W75-06705

PHYTOPLANKTON IN THE OLIGOHALINE LAKE, SELSO: PRIMARY PRODUCTION AND STANDING CROP,

Copenhagen Univ. (Denmark). Institut for Thallophyta.

K. Woldike.

Ophelia. Vol 12, No 1/2, p 27-44, 1973, Illus.

Descriptors: *Phytoplankton, *Lakes, Europe, Nutrients, Aquatic algae, Growth rates, Environmental effects.

Identifiers: Chlorophyll, Crop, *Denmark, Haline, Lake, Nitrate, Oligo, pH, Phosphate, Phyto, Plankton, Primary, Production, Salinity, Selso, Silicon, Standing.

The variations in the phytoplankton were measured during 1 yr in the oligohaline Danish lake, Selso. Measurements were made of the variations in volume of total phytoplankton and in volumes of the different algal groups. The amount of chlorophyll-a was measured, and the primary production determined, as the maximum rate of gross production. Among the more important environmental factors measurements were made of temperature, transparency, conductivity, salinity, pH, alkalinity, OZ content and the nutrients nitrate, phosphate and silicon. The relations between the variations in pH, alkalinity and the content of nutrients are discussed. A comparison is made with other, earlier investigated Danish inshore waters.—Copyright 1974, Biological Abstracts, Inc.

LIFE IN A LAKE RESERVOIR: FEWER OP-TIONS, DECREASED PRODUCTION, Institute of Freshwater Research Drottningholm

T. Lindstrom. Ambio. Vol 2, No 5, p 145-153, 1973, Illus.

(Sweden).

Identifiers: Aquatic animals, *Ecosystem, Fish, Fishing, Lakes, Options, Plankton, *Production, Reservoirs, Zooplankton, *Sweden.

The joint efforts of several research units were directed towards 4 levels in the ecosystems of lake reservoirs: The physicochemical environment, the plants, the bottom animals and zooplankton and the fish. Information from some recent Swedish studies is compiled. The overall effect of the transformations is a decrease in the production capacity and a simplification of the ecosystems of lake reservoirs. Fishing can be maintained, if based mainly on the production in the pelagic block of the ecosystem.—Copyright 1974, Biological Abstracts, Inc.

A COMPARISON OF FRESH-WATER PROTOZOAN COMMUNITIES IN GEOGRAPHICALLY PROXIMATE BUT CHEMICALLY DISSIMILAR BODIES OF WATER, Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology. For primary bibliographic entry see Field 2H. W75-06715

EFFECT OF WATER POLLUTION ON ICHTHYOFAUNA: PART I. TOXICITY OF METALS AND OF INOR-GANIC SUSPENSIONS (IN POLISH), Wyzsza Szkola Rolnicza, Krakow (Poland).

P. Enler.

Postepy Nauk Roln. Vol 18, No 3, p 71-94, 1971, Illus.

Descriptors: Water pollution, Pollutants, Oxygen, Fish, Rainbow trout, *Water pollution effects, Chemical analysis, Metals, Salts, Inorganic compounds, Bioindicators, *Toxicity, *Metals.

Water pollutants alter the physical, chemical and sanitary properties of H2O, change the quantity and quality of organisms on which fish live and have an immediate toxic effect on fish. The concentration of pollutants is relevant. Toxicity is less under adequate O2 levels. Detailed laboratory investigations covered the most important chemical elements, with rainbow trout used as the test organism.—Copyright 1974, Biological Abstracts, Inc.
W75-06719

ENVIRONMENTAL CONTAMINANTS INVENTORY STUDY NO. 2 - THE PRODUCTION, USE AND DISTRIBUTION OF CADMIUM IN CANADA.

Canada Centre for Inland Waters, Burlington (Ontario). For primary bibliographic entry see Field 5B. W75-06742

PHYTOPLANKTON OF THE NATRON-CONTAINING WATERS OF KANEM (CHAD): V. THE MESOHALINE LAKES (IN FRENCH), Office de la Recherche Scientifique et Technique Outre-Mer, Fort-Lamy (Chad).

Cah O R S T O M (Off Rech Sci Tech Outre-Mer) Ser Hydrobiol. Vol 5, No 1, p 73-84, 1971, Illus.

Descriptors: "Phytoplankton, *Lakes, *Seasonal, Analysis, Africa, Cyanophyta, Diatoms. Identifiers: "Chad(Kanem), Diatomophyceae, *Mesohaline Lakes, *Natron, Oscillatoria-platensis, vas-mines.

The seasonal variation of phytoplankton was studied for 15 mo. in 2 natroned mesohaline lakes Equatorial Africa. Cyanophyceae and Diatomophyceae are dominant in the phytoplankton having the same characteristics as the polyhaline lakes. Oscillatoria platensis var. minor Rich is the characteristic and generally the most

abundant species of these media.--Copyright 1973, Biological Abstracts, Inc. W75.06778

OSMOREGULATORY RESPNSES TO DDT AND VARYING SALINITIES IN SALMO GAIRDNERI - I. GILL NA-K-ATPASE, SI TO HE REL

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- I. GILL NA-K-ATPASE, Idaho State Univ., Pocatello. Dept. of Biology. T. P. Leadem, R. D. Campbell, and D. W. Johnson. Comparative Biochemistry and Physiology, Vol 49A, No. 1, p 197-205, September 1, 1974. 4 fig, 29 ref.

Descriptors: *Laboratory tests, *DDT, *Rainbow trout, Freshwater, Sea water, Enzymes, Salt tolerance, *Water pollution effects. Identifiers: *Osmoregulatory response.

DDT inhibited activity of Na-K-ATPase and Mg-ATPase in gills of rainbow trout adapted to freshwater, one-third sea water, and sea water. A negative correlation was found between gill Na-K-AT-Pase and serum sodium in treated fish in sea water. Enzyme activity was inhibited in fresh water fish but no osmoregulatory impairment was found, indicating a minor or non-existent role for gill Na-K-ATPase in fresh water osmoregulation. Enzyme activity was inhibited in trout acclimated to sea water. (Sandoski-FIRL)

HYDROBACTERIOLOGICAL INVESTIGA-TIONS IN LAKE CONSTANCE: III. PROGRES-SIVE GROWTH OF PLANKTON-DEPENDENT PRODUCTION OF BACTERIA AS AN INDICA-TION OF EUTROPHICATION, (IN GERMAN), Staatliches Institut fuer Seenforschung und Seenbewirtschaftung, Langenargen (West Germany), J. Deufel. Int Rev Gesamten Hydrobiol, Vol 57, No 1, p 153-

156, 1972. English summary.

Descriptors: *Lakes, *Eutrophication, *Bacteria,

Descriptors: *Lakes, *Eutrophication, *Bacteria, Plankton, Europe, Water pollution effects, Bioindicators, Pollutant identification. Identifiers: *Lake Constance(West Germany).

Within the last 10 yr the number of bacteria in the pelagic region of Lake Constance (Bodensee)(West Germany), counted during the circulation period, increased almost 10 fold. This growth agrees completely with other biological and chemical results, and indicates a progressive eutrophication of the lake.—Copyright 1973, Biological Abstracts, Inc.

A PRELIMINARY PHYTOPLANKTON SURVEY OF TWELVE ADIRONDACK LAKES, New York State Dept. of Environmental Conser-

vation, Delmar. Wildlife Research Lab.
N. B. Reynolds, and L. M. Mercer.
NY Fish Game J, Vol 21, No 1, p 58-66, 1974. Illus.
Identifiers: *Adirondack lakes, *Eutrophication,
Hurricane Agnes, *Lakes, *Phytoplankton, Surveys, *New York, Water pollution effects.

This investigation was conducted to evaluate the relationships between composition and abundance of phytoplankton in 12 lakes in the Adirondack region of New York (USA). Possible differences in eutrophication are also considered. Five divisions and 60 taxa were cataloged. All the lakes were found to be oligotrophic and dystrophic althought there was some indication of pollution. Possible effects of Hurricane Agnes in 1972 are discussed.—Copyright 1974, Biological Abstracts, Inc. W75-0684

5D. Waste Treatment Processes

RECYCLING OF SEWAGE EFFLUENT BY IR-RIGATION: A FIELD STUDY ON OAHU,

Waste Treatment Processes—Group 5D

SECOND PROGRESS REPORT FOR JULY 1972 TO JULY 1973, Hawaii Univ., Honolulu. Water Resources

Research Center.

I. S. Lau.

nical Report No 79, November 1974. 110 p, 6 fig, 8 tab, 56 ref, append.

Descriptors: Effluents, *Sewage effluents, Groundwater, Heavy metals, Lysimeters, Irrigation, *Sewage treatment, Activated sludge, *Sugarcane, Viruses, *Waste water treatment, Recycling, *Water reuse, *Hawaii. ldentifiers: *Oahu(HI).

Recycling secondary sewage effluent by irrigation under Hawaiian conditions is being studied in pilot fields near Mililani Town in central Oahu to determine the feasibility of waste water application to soil, grass, and sugarcane and its probable effects on the quality of groundwater in terms of dis-solved materials and viruses, and its effects on surcane yield and grasslands. Studies began in garcane yield and grassianus. Studies organizari 1971 with a 5-ft deep hydraulic lysimeter in an effluent-irrigated grassed area of the Mililani Sewage Treatment Plant grounds. Five furrows of the Advisor Company's maturing sugarcane in the Oahu Sugar Company's Field No. 240 were also irrigated with the same effluent until harvest. In February 1973, 10 (0.1-acre each) replicates receiving 3 irrigation treatments were planted in Oahu Sugar Co. Field No. 246. The 3 irrigation schemes were: (1) ditch water only, (2) effluent for the first year of the growth cycle and ditch water for the second year of the growth cycle, and (3) effluent throughout the growth cycle. Ceramic point samplers were installed in test plots and lysimeters were installed for leachate collection. Two percolate lysimeters with sugarcane were installed adjacent to the test plots with one lysimeter irrigated with ditch water and the other with effluent. Sugarcane growth parame ters are being monitored periodically. The predominant soil is the Oxisol Lahaina series on which most of Hawaii's irrigated sugarcane is grown. Raw sewage, secondary effluent, and leachate from the soils were assayed for various physical, chemical (including pesticides and heavy metals), sanitary, and microbiological quality parameters. A virus laboratory, the first of its kind in Hawaii, was established to serve the project and to train personnel. W75-06361

SOIL AS A MEDIUM FOR THE RENOVATION OF ACID MINE DRAINAGE, Pennsylvania State Univ., University Park. Dept.

of Agronomy.

W. F. Beers, E. J. Ciolkosz, and L. T. Kardos.

Reprint Series No 37, October, 1974, 12 p, 11 fig, 1 tab, 14 ref. OWRR A-027-PA(2). 14-31-0001-4038.

Descriptors: *Acid mine water, Physical properties, Chemical properties, *Water pollution, Coals, *Bituminous materials, *Soil chemical pro-Cours, "Bituminous materials, "Soil chemical properties, "Calcium carbonate, Ohio, Pennsylvania, West Virginia, Kentucky, Waste water treatment. Identifiers: Renovation, Rayne soil, Guernsey soil, Lime content, "Soil renovation, Column effluent.

Treatment of the acid mine drainage problem has followed many paths in the past, but none of the methods of treatment has used soil as a renovating medium. Soils have extensive exchange and surface features that could be used alone or in conjunction with other treatments to renovate acid mine water. Hence, a study was initiated to determine the feasibility of using soil as a renovating medium. Five inches of acid mine water were added weekly to reconstructed 40-inch soil profile columns of 2 soils found extensively in the bituminous coal regions of Pennsylvania, Ohio, West Virginia, and Kentucky, and the quality of the column effluent was monitored for 42 weeks. Both the Rayne and Guernsey soils possess substantial but different capabilities to renovate acid mine water initially and for the length of this study. The soils absolute amount and differences noted in renovating capacity are a function of their physical and chemical properties. The Rayne rapidly declined in its renovating capacity in the latter stages of the study. This could have been prevented by liming treatments. (Sink-Penn State) W75-06365

NEW CONCEPTS IN SOIL SURVEY INTERPRETATIONS FOR ON-SITE DISPOSAL OF SEPTIC TANK EFFLUENT Wisconsin Univ., Madison. Dept. of Soil Science.

Soil Science Society of America Proceedings, Vol 38, No 6, p 941-946, November-December 1974. 2 fig, 22 ref. EPA Grant 802874-01-0.

Descriptors: *Septic tanks, *Sewage disposal, *Soil disposal fields, *Soil surveys, *Land use, Soil types, Water pollution sources, Waste water disposal, Waste disposal, Waste treatment, Sewage treatment, Soil investigations, Permeability, Zoning, Land development, Land classifica-tion, Land management, Land resources, On-site tests, Planning. Identifiers: Purification

Soil survey interpretations for on-site disposal of septic tank effluent were made in terms of soil limitations by using existing technology. New technology, based on a detailed analysis of liquid movement and associated purification, can be used to overcome severe and very severe limitations and to reduce slight and moderate limitations. Experimental data obtained and technology derived from single experimental innovative disposal systems are relevant only if extrapolations can be made to other soils shown to be identi-cal. Three procedures of extrapolation were discussed: (1) detailed on-site spot checks of key properties, (2) on-site taxonomic soil classifica-tions, and (3) taxonomic soil classifications at the experimental site followed by extrapolation to mapping units named after the same soil series. Largely unknown variability of key properties for liquid waste disposal in soil series or in mapping units may reduce the practical value of the latter two procedures but potential advantages are (1) reductions of expensive on-site inspections and (2) use of soil maps for showing potential changes in land-use patterns following introduction of in-novative technology. This approach emphasizes soil potential rather than soil limitations. (Sanderson-ISWS) W75-06402

AFROBIC DIGESTION OF EXTRACELLULAR MICROBIAL POLYSACCARIDES.

Oklahoma State Univ., Stillwater. Bioenvironmen-

tal Engineering Labs.
A. W. Obayashi, and A. F. Gaudy.

Research Report, 1972. 32 p, 5 fig, 2 tab, 30 ref. (Presented at 27th Industrial Waste Conference, Purdue University, May 2-4, 1972). OWRT A-035-OKLA(1).

Descriptors: *Oxidation, *Microorganisms, *Sludge, *Waste water treatment, Aerobic treatment, Aeration, Bacteria, Organic matter, *Oxidation, *Aeration.

Identifiers: Total oxidation, Extended aeration, Polysaccharides, Slime layer.

The extended aeration, or total oxidation, sludge process is based on the premise that the increase in biological solids resulting from metabolism of the incoming waste is balanced by the decrease in biological solids due to their aerobic digestion. The question about this method is whether all the organic constituents of the cell, such as those in the cytoplasm, the walls and membrane and the capsular slime layer, can be metabolized and converted to carbon dioxide. The slime layer is usually complex heteropolysaccharides. This investigation was made to determine whether extracellular heteropolysaccharides of microorganisms can be

used as sources of organic carbon for the growth of other microorganisms. The results show that extracellular polysaccharide cannot be considered biologically inert material and that it can metabolized. These results support the idea of total oxidation of biological solids. (Orr-FIRL) W75-06405

EFFLUENT FOR IRRIGATION - A NEED FOR CAUTION.

Illinois State Water Survey, Urbana.

W. H. Walker

Ground Water, Vol 13, No 1, p 11-16, January-February 1975. 24 ref.

Descriptors: *Water pollution, *Water pollution control, *Soil contamination, *Sludge disposal, *Sewage effluents, Liquid wastes, Waste water disposal, Municipal wastes, Legal aspects, Economics, Irrigation.

Most municipal waste treatment systems receive, treat, and eventually discard to some segment of the environment storm runoff and liquid wastes from all industrial, commercial, and domestic areas and establishments in the community. Existing pollution protection laws prohibit surface-water dilution of these effluents and sludges. Drying, burning, or distilling them is very costly, causes air pollution, and produces potentially hazardous chemical residues which still must be diposed of in some nonpolluting fashion. There are no 'technologically feasible, economically reasonable' alternative methods of effectively treating these wastes to an acceptable quality level for discharge to streams. For these reasons, land disposal of sewage effluent and sludges now is being widely promoted and employed as the best available method of treatment. Most operating facilities for land disposal of effluents are not monitored adequately to provide required data to quantitatively evaluate the total buildup and possi-ble subsequent release of toxic chemicals in contiguous soil, plant, and water environments. Con-sidering the potential danger to public health which may result if widespread use of this particular waste disposal practice is employed, it is imperative that all such permitted sites be monitored and evaluated in detail for all possible adverse effects, and the results of these findings then considered in the design and operation of future instal-lations. Concurrent with this work, research must be expedited and greatly expanded to develop effective alternative treatment methods to employ where land disposal of effluent probes to be impracticable. (Gibb-ISWS)

ECOLOGICAL AND PHYSIOLOGICAL IMPLI-CATIONS OF GREENBELT IRRIGATION, PROGRESS REPORT OF THE MALONEY CANYON PROJECT-1974, California Univ., Riverside. Dept. of Plant

V. B. Younger, and T. E. Williams.

Available from the National Technical Informa-tion Service, Springfield, Va 22161, as PB-241 101, \$5.25 in paper copy, \$2.25 in microfiche. Progress Report, California Water Resources Center, Contribution 148, 1974, (California Water Resources Center Project UCAL-WRC-W-374). 114 p, 11 fig, 20 tab, 40 ref. OWRT B-161-CAL(1).

Descriptors: *Waste water teatment, Irrigation, Environmental effects, *Irrigation effects, *Vegetation effects, Water pollution effects, *Water reuse, Water quality, Reclaimed water, *California.

Identifiers: *Maloney Canyon(Calif), *Greenbelt

The multipurpose nature of a waste water irrigated greenbelt such as Maloney Canyon dictates the establishment of extensive research into the responses of components of plant, soil, and water systems to the application of effluent irrigation.

Group 5D—Waste Treatment Processes

The feasibility of such a greenbelt in terms of beneficial responses versus potential environmental degradation was investigated. The clarification of both factors in all studies is essential for the design to be effective. Research at Maloney Canyon over the past 5 years has centered along two basic lines. The first is aimed primarily at the effects which effluent irrigation has upon native chaparral and introduced vegetation types as re-lated to the selection of suitable species or entire vegetation types for establishment in a fire sup pressing greenbelt. The second is concerned with examination of the components of the applied waste water, as both nutrients and potential pollutants, in their effects upon plant, soil, water systems, and the response of those systems in a 'living filter' renovation process. (Synder-California. Davis) W75-06461

RECLAMATION OF ENERGY FROM OR-GANIC WASTES.

Illinois Univ., Urbana. Dept. of Civil Engineering. I.T. Pfeffer

Available from the National Technical Informasvanable from the National feethnical Informa-tion Service, Springfield, Va 22161 as PB-231 176, \$5.75 in paper copy, \$2.25 in microfiche. Environ-mental Protection Agency, Cincinnati, Ohio, EPA-670/2-74-016, March 1974. 128 p. 27 fig, 34 tab, 48 ref, 5 append. EPA Grant R-800766.

Descriptors: *Waste disposal, *Fermentation, *Solid wastes, *Gases, *Organic wastes, Methane, Natural gas, Fuels, Energy, Wastes, Cellulose, *Anaerobic digestion, Methodology, Cost analy sis, *Waste water treatment, Nutrient requirements, Economics.

Identifiers: *Resource recovery, Substrates

The anaerobic fermentation process was applied to the production of methane from the organic fraction of urban refuse. Shredded domestic refuse from which the inorganic fraction was separated was used as a substrate. Raw sewage sludge was added to the substrate in proportion to the rate at which it is produced by a population producing a given quantity of refuse. The quantity and quality of gas produced, the rate of gas production, the solids reduction, nutritional requirements, and operating problems were evaluated in a laboratory system operating at tempera-tures ranging from 35 to 60C. The results of the laboratory study together with published data on both capital and operating costs of refuse shredding, refuse separation, reactor volume, reactor mixing, reactor heating, and residue de watering were used to analyze the economics of the process. (Sims-ISWS) W75-06471

RECLAMATION OF ACID RINSE WATER, General Electric Co., Lynn, Mass. Direct Energy Conversion Programs.

R. M. Dempsey, and A. B. LaConti. Available from the National Technical Information Service, Springfield, Va 22161 as AD-784 445, \$3.75 in paper copy, \$2.25 in microfiche. (1974). 43 p, 12 fig, 15 tab, 4 ref. Army Contract DAAK02-73-C-0407.

escriptors: *Membranes, *Reverse osmosis, *Acids, *Waste water treatment, Chemical wastes, Osmosis, Films, Ion exchange, Chemisaboratory tests, Membrane processes, tion techniques, Waste treatment, Separation Semipermeable membranes.

A possible limitation of most commercial reverse osmosis membranes is marginal stability during continuous operation in strong acid media (pH less than or equal to 1.5). A modified membrane designated sulfonated P30 that is readily solvent cast and exhibits good film forming characteristics was developed and appears promising for use as a reverse osmosis membrane in strong acid media. It was successfully used for fuel cell applications in

contact with strong acid electrolytes for thousands of hours. During preliminary feasibility tests with this membrane, it was demonstrated that a 0.5 mil (0.0005 in.) knife-cast membrane exhibited approximately 90% rejection when evaluated for reverse osmosis renovation of a 3000 ppm acid feed simulating rinse water from a military nitrocellulose A program was conducted to develop production techniques for fabricating composite films and spiral wound modules of the membrane system for reverse osmosis application of recovering acid rinse water. Three trial modules were developed and tested, and twelve production type spiral modules were fabricated, tested, and delivered. (Sims-ISWS)

RECOMMISSIONING OF SEA W DEMINERALIZER, SERIAL NO. 204, COAST GUARD STATION, OCRAC OCRACOKE. COAST GUARD NORTH CAROLINA.

Ionics, Inc., Cambridge, Mass. For primary bibliographic entry see Field 3A.

LAND TREATMENT OF MENHADEN WASTE WATER BY OVERLAND FLOW.

Louisiana State Univ., Baton Rouge. Dept. of Marine Science.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 062, \$5.25, in paper copy, \$2.25 in microfiche. Ms Thesis, December 1974. 98 p, 9 fig, 20 tab, 39 ref, 2 append. OWRT A-033-LA(2). NOAA Contract 04-3-158-19.

Descriptors: *Waste water treatment, *Overland flow, *Nutrient removal, Waste treatment, Industrial wastes, Organic wastes, Water chemistry, Marine fish, Fish handling facilities, Spoil banks, Spraying, Vegetation effects, Groundwater, Infil-tration, Pollutants, Path of pollutants. Identifiers: Gulf menhaden, Stickwater, Fish

From April through August 1974, menhaden processing wastewater from an industrial plant near Dulac, Louisiana, was partially reclaimed with the use of land treatment by overland flow. The waste was pumped from a primary treatment pond after screening, and was spray-discharged at a rate of 5.08 cm per week onto a naturally vegetated spoil bank of clay soil material (6% slope, 30 m long). The effluent flowed unevenly through the plant cover and litter layer. The effluent, with total organic carbon, nitrogen, and phosphorus concentrations of 800, 600, and 50 mg/l, respectively, was purified by the action of the soil-plant system, reducing the waste nutrient load an average of 58% for carbon, 51% for nitrogen, and 53% for phosphorus. Roseau cane, the dominant plant on the slope, increased in live standing crop by 55%, in nitrogen by 47%, and in phosphorus by 13%. Levels of groundwater nitrogen just exceeded 10 mg/1 at a depth of 30 cm after five months. Waste total coliform MPN was diminshed by 66% over the slope. (Sims-ISWS)

ANALYSIS OF MULTIPLE OBJECTIVES IN WATER QUALITY, Case Western Reserve Univ., Cleveland, Ohio.

Systems Engineering Div. Y. Y. Haimes, and W. A. Hall.

Journal of the Hydraulics Division, Society of Civil Engineers, Vol 101, HY4, Proceedings paper No 11234, p 387-400, April 1975. 1 fig, 19 ref.

Descriptors: *Water quality, *Planning, *Management, *Thermal pollution, Hydraulics, Methodology, Biochemical oxygen demand, Dissolved oxygen Water Water Biochemical oxygen demand, Dissolved oxygen by the control of the control of the control oxygen by the control solved oxygen, Waste water treatment, Optimiza-tion, Constraints, Algae, Temperature, Mathematical models, Systems analysis, Equations, Streams, Treatment facilities.

Identifiers: Multiple objectives, *Surrogate Worth Tradeoff method, Cost minimization, Streeter-Phelps equation, Multilevel optimization, Problem decomposition, Lagrange multipliers.

Water quality planning is characterized by multiple and often noncommensurable goals and objec-tives. Needed are mathematical models which are susceptible to multiple objective functions in their noncommensurable forms and units. Herein, a number of water quality objectives and goals, classified as primary and secondary objectives, are introduced. The concepts of noninferior (Parento optimum) solution, indifference band, and preferred solution are defined. A general multiobjective model for water quality planning and management is developed. Specific multiple objec-tives and constraints associated with biological oxygen demand, dissolved oxygen, thermal pollu-tion, and algae bloom are introduced and exed. An example wastewater treatment problem is presented werein three noncommensurable objectives are considered: minimizing the total treatment cost, minimizing changes in temperature, and minimizing the maximum algae concentration for all reaches. The Surrogate Worth Tradeoff (SWT) method is reviewed and its application to the water quality model is analyzed. In particular, basics in the derivation of the trade-off functions and the surrogate worth functions are given. The SWT method permits accurate treatment of noncommensurate objectives in multiple objective systems. The method recognizes that op-timization theory is usually more concerned with the relative value of additional increments of the various goals than with their absolute values. (Bell-Cornell) W75-06559

SYSTEM FOR REGULATION OF COMBINED

Municipality of Metropolitan Seattle, Wash. C. V. Gibbs, S. M. Alexander, and C. P. Leiser. Journal of the Sanitary Engineering Division, American Society of Civil Engineer, Vol 98, No SA6, p 951-972, December 1972. 9 fig, 3 tab, 6 ref.

Descriptors: *Combined sewers, Flow, *Regulation, Computers, Hydrology, *Runoff, Overflow, *Control systems, Pumping stations, Flood routing, Water quality, Telemetry, Operations, Storage, Mathematical models, Storage,

tions, Storage,
*Washington.
Identifiers: *Automatic control, Rule curve Identifiers: *Automatic control, Rule curve technique, Control equipment, Real-time computations, *Seattle(Wash).

The Municipality of Metropolitan Seattle has installed a computer directed control system which provides centralized control of regulator and pumping stations on trunk and interceptor sewers. The system will represent a procedure for regula-tion of combined sewage flows through use of available storage in trunk and interceptor sewer to reduce or eliminate overflows. The equipment includes the computer based central facility and automatic controls for 36 remote pumping and regulator stations. A procedure has been developed for automatic control using the rule curve technique. The central facility includes an operator oriented console and facilities for background data processing. Communication with remote stations is over leased telephone lines. The equipment at each remote station is designed for failsafe opera-tion to return to local control in an orderly manner in the event of failure of the central station equip-ment or communication lines. (Bell-Cornell)

SEA WATER DESALINATION BY REVERSE OSMOSIS, RECENT EXPERIENCE. Societe Generale d'Epuration et d'Assainissement Degremont, Suresnes (France). For primary bibliographic entry see Field 3A. W75-06567

Waste Treatment Processes—Group 5D

CONSTRUCTION AND INITIAL OPERATION OF THE VTE/MSF MODULE, Office of Saline Water, Washington, D.C. For primary bibliographic entry see Field 3A. W75-06568

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WATER REGULATIONS-AREAWIDE WASTE TREATMENT MANAGEMENT PLANNING AREAS AND RESPONSIBLE PLANNING AGEN-

For primary bibliographic entry see Field 5G. W75-06599

WATER REUSE, A BIBLIOGRAPHY, VOLUME

Office of Water Research and Technology,

Washington, D.C.

Available from the National Technical Information Service, Springfield, Va 22161, as PB-241 171, 511.25 in paper copy, \$2.25 in microfiche. Water Resources Scientific Information Center Report OWRT/WRSIC 75-204-VOL 3, March 1975, 444 p.

Descriptors: Artificial recharge, Desalination, Fil-tration, Groundwater, Industrial wastes, Ion exchange, Irrigation water, Municipal wastes, Pol-lution abatement, Potable water, Recirculated water, *Reclaimed water, Return flow, Reverse osmosis, *Sewage treatment, *Tertiary treatment, Waste disposal, *Waste water treatment, Water conservation, Water purification, Water quality, *Water treatment, *Bibliographies.

This report, containing 291 abstracts, is another in a series of planned bibliographies in water resources to be produced from the information base comprising SELECTED WATER RESOURCES ABSTRACTS (SWRA). At the time of search for this bibliography, the data base had 80,488 abstracts covering SWRA through January 15, 1975 (Volume 8, Number 2). Author and subject indexes are included. (See also W75-06639, W73-11701 and W75-11702)

WATER REUSE, A BIBLIOGRAPHY, VOLUME

Office of Water Research and Technology,

Washington, D.C. Available from the National Technical Inform tion Service, Springfield, Va 22161, as PB-241 172, \$11.25 in paper copy, \$2.25 in microfiche. Water Resources Sceintific Information Center Report OWRT/WRSIC 75-204-Vol. 4, March 1975, 448 p.

Descriptors: Aritificial recharge, Desalination, Filtration, Groundwater, Industrial wastes, Ion exchange, Irrigation water, Municipal wastes, Polution abatement, Potable water, Recirculated water, *Reclaimed water, Return flow, Reverse osmosis, *Sewage treatment, *Tertiary treatment, Waste disposal, *Waste water treatment, Water conservation, Water purification, Water quality, *Water treatment, *Bibliographies.

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PRACTICAL APPLICATIONS FOR REUSE OR WASTEWATER,

Los Angeles County Sanitation District, Calif. For primary bibliographic entry see Field 3C.

AUTOMATION OF SCUM SKIMMERS, CALU-MET TREATMENT WORKS, PRELIMINARY SETTLING TANKS.

Greeley and Hansen, Chicago, Ill.

The Metropolitan Sanitary District of Greater Chicago, Chicago, Illinois, September 1971. 9 p, 9 fig, 2 tab

Descriptors: *Automation, *Scum, *Settling basins, *Sewage treatment, *Treatment facilities, *Primary treatment, Secondary treatment, Sludge disposal, Illinois, Waste water treatment.

Identifiers: Scum removal, Scum skimming, Preliminary settling tanks, Metropolitan Sanitary District of Greater Chicago, Chicago(Illinois).

The Calumet Treatment Works provides facilities for primary and secondary treatment and sludge disposal. The primary portion of the treatment plant consists of a pumping station, grit chambers and 20 preliminary settling tanks. The existing scum removal and handling facilities are limited to the preliminary settling tanks and include manually operated scum tipping troughs on each of the preliminary settling tanks. A mixture of scum and water discharged in to the scum troughs flows by gravity to a scum pump that pumps the mixture to the scum concentration tank. Three methods of automating the preliminary settling tank scum skimming operation were investigated These were electric motor operation, pneumatic cylinder operation and replacement of the tipping troughs by chain and flight-type scum cross collectroughs by chain and tight-type scum cross collec-tors to beach scum into a scum box. It was con-cluded that any method of automation would require the rehabilitation of the troughs for proper operation. It is recommended that the existing troughs and bearings and bearing supports be reha-bilitated and that an arrangement using pneumatic cylinders to be provided to operate the tipping troughs. The cost was estimated at \$11,7000. troughs. The cost was estimated at \$117,000. W75-06665

SCUM REMOVAL FACILITIES, NORTH SIDE TREATMENT WORKS, FINAL SETTLING TANKS.

Greeley and Hansen, Chicago, Ill.

The Metropolitan Sanitary District of Greater Chicago, Chicago, Illinois, May 1971. 16 p, 10 fig,

Descriptors: *Treatment facilities, *Scum. *Sewage treatment, *Primary treatment, *Secondary treatment, *Settling basins, Pumping

stations, Illinois, Waste water treatment.
Identifiers: Scum removal, Final settling tanks,
Scum concentration tanks, Metropolitan Sanitary
District of Greater Chicago, Chicago (Illinois).

The North Side Treatment Works provides facilities for primary and secondary sewage treatment. The secondary portion of the treatment plant comprises Batteries A, B, C and D. Batteries A, B and C each comprise 12 aeration tanks and 14 final settling tanks. Battery D comprises 6 aeration tanks and final settling tanks. Studies of the final settling tanks have been made to outline alternative scum removal systems. Three methods of collecting scum that floats to the surface of the square final settling tanks in Batteries A, B and C have been investigated. These methods all involve scum tipping pipes and scum baffles. Each circular final settling tank in Batteries A, B, C and D would be provided with scum collecting facilities comprising scum skimming blades, scum baffles, scum troughs and scum withdrawal piping. The scum from the final settling tanks would be conveyed to the proposed scum concentration facilities. It is recommended that studies be made to determine the effect of the increased overflow rate on effluent quality of the final settling tanks. Torque flow type pumps to pump the scum and water directly to the scum concentration tanks are recommended for the square final settling tanks for Batteries A, B and C. W75-06666

SCUM REMOVAL FACILITIES, WEST-SOUTHWEST TREATMENT WORKS, BATTE-RIES A. B. AND C.

Greeley and Hansen, Chicago, Ill.

The Metropolitan Sanitary District of Chicago, Chicago, Illinois, July 1971. 14 p, 10 fig, 2 tab, 1

Descriptors: *Scum, *Sewage treatment, *Treatment facilities, *Primary treatment, *Secondary treatment, Pumping stations, Piping systems(Mechanical), Settling basins, Illinois, Waste water treatment.

Identifiers: Scum removal, Final settling tanks, Scum concentration tanks, Scum piping, Metropolitan Sanitary District of Greater Chicago, Chicago(Illinois).

The West-Southwest Treatment Works operated by the Metropolitan Sanitary District of Greater Chicago provides facilities for primary and secondary treatment and sludge disposal. The secondary portion of the plant consists of batteries A, B and C which are each comprised of eight aeration tanks and 24 final settling tanks. The existing scum removal and handling facilities are limited to the preliminary tanks and include scum skimming mechanisms on each of the preliminary tanks that deliver a mixture of scum and water to collector troughs. In order to improve the overall plant capture of scum, a scum removal system will be in-stalled in the final settling tanks. Each final tank will be arranged with scum collecting facilities comprising scum skimming blades, scum baffles, scum troughs and scum withdrawal piping. Studies of alternative arrangements of pumping units, pumping stations, and scum piping were made. The pumping unit types considered were centrifugal torque flow, centrifugal rotary piston, plunger, pneumatic ejector and progressing cavity pumps. Two types of pumping stations were considered: on-site construction and pre-fabricated package units. Various types of piping materials for scum piping were investigated. Two alternative locations for discharging the scum collected in the final tanks were studied. Cost estimates for all alternatives are given and recommendations are given for odifications and new construction. (Poertner) W75-06667

SCUM REMOVAL FACILITIES, NORTH SIDE TREATMENT WORKS, PRELIMINARY SETTLING TANKS.

Greeley and Hansen, Chicago, Ill.
The Metropolitan Sanitary District of Greater
Chicago, Chicago, Illinois, July 1971. 13 p, 7 fig, 3

Descriptors: *Scum, *Treatment facilities, *Sewage treatment, *Settling basins, *Primary *Treatment facilities, treatment, Secondary treatment, Pumping stations, Illinois, Waste water treatment.

Identifiers: Scum removal, Preliminary settling tanks, Scum concentration tanks, Metropolitan Sanitary District of Greater Chicago. Chicago(Illinois).

The North Side Treatment Works provides facilities for primary and secondary sewage treatment. The primary portion of the treatment plant con-sists of a pumping station, grit chambers and 8 preliminary settling tanks. Studies of the prelimi-nary settling tanks have been made to outline alternative scum removal systems. Four methods of collecting scum that floats to the surface of the preliminary settling tanks have been investigated. Two methods of conveying the scum that floats to the surface of the preliminary settling tanks to the effluent side of the tank where scum removal facilities would be located were considered. In order to further dewater the scum from the preliminary settling tanks, scum concentration tanks will be provided. It was recommended that the preliminary tanks be provided with scum collecting facilities consisting of a chain and flight type scum cross collector, scum beach, scum box, nd scum baffle. Two onsite constructed pumping

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stations, a 6-inch scum line to transfer the scum to the concentration tanks, and two scum concentration tanks were also recommended. (Poertner)

SCUM REMOVAL FACILITIES, CALUMET TREATMENT WORKS, FINAL SETTLING TANKS.

Greeley and Hansen, Chicago, Ill.

The Metropolitan Sanitary District of Greater Chicago, Chicago, Illinois August 1971. 14 p, 6 fig, 1 tab

Descriptors: *Sewage treatment, *Treatment facilities, *Primary treatment, *Secondary treatment, *Scum, Settling basins, Illinois, Waste water treatment, Sludge treatment.

Identifiers: Scum skimming, Final settling tanks, Metropolitan Sanitary District of Greater Chicago, Calumet Treatment Works.

The Calumet Treatment Works provides facilities for primary and secondary treatment and sludge disposal. The secondary portion of the treatment process consists of Batteries A, B and C. Batteries A and B are comprised of 11 aeration tanks and 8 final settling tanks each. Battery C is comprised of 6 aerations tanks and 8 final settling tanks isting scum removal and handling facilities are limited to the preliminary settling tanks. Studies of alternative scum removal systems for the final settling tanks have been made to outline needed additions required to collect scum. Three methods of collecting scum that floats to the surface of the square final settling tanks in Batteries A and B have been investigated. Each circular final settling tank in Battery C would be provided with scum collecting facilities comprising scum skimming blades, scum baffles, scum boxes and scum withdrawal piping. The scum and water collected on the surface of the final settling tanks at Batteries A, B and C would be conveyed to the existing scum concentration tank. Recommendations were also made for the provision of scum-skimming facilities consisting of probing arms, scum troughs, scum baffles, and scum withdrawal pip-ing for the square final settling tanks at Batteries A and B. (Poertner)

RESULTS OF TESTING CLEAN-FLO LAKE CLEANSER IN FLORIDA LAKES,

Florida State Game and Fresh Water Fish Commission, Lake City; and Clean-Flo Labs., Inc., Hopkins, Minn.

L. Trent, and B. McArthur. Hyacinth Control Journal, Vol 12, p 44-45, May 1974, 2 tab. 3 ref.

Descriptors: "Water treatment, "Nutrient removal, "Phosphates, "Aquatic algae, "Chemical precipitation, "Algal control, Cyanophyta, Lakes, Florida.

Identifiers: Filamentous algae, Lemna minor,

A study was made of efficacy and observable toxicity in Florida lakes of a new product formulation icity in Florida lakes of a new product formulation comprising an admixture of soluble calcium, aluminum and sodium cations, and a buffering agent. The intended purpose of the compound is to remove phosphate from natural waters by precipitation, thereby causing a natural decline of aquatic flora. Eight impoundments were treated with quantities ranging from 5 ppm to 20 ppm, and visual results noted. The results of the pilot study indicate the effectivness of Clean-Flo Lake Cleanser (patent pending) in controlling certain aquatic weeds in Florida. No dead fish were detected and, in earlier laboratory studies, fish survived in concentrations up to 1000 ppm with no noticeable deleterious effects. Further studies emphasizing more accurate chemical analysis and more complete algae tests are warranted. More studies dealing with aquatic animals native to Florida waters are also recommended. (Poertner)

PROCESS FOR THE EXTRACTION OF PHENOL FROM WASTE WATERS IN THE FORM OF UREA-FORMALDEHYDE-PHENOL CONDENSATES,

Societa Italiana Resine S.p.A., Milan (Italy). (assignee) S. Vargiu, S. S. Giovanni, G. Mazzoleni, and S.

Pezzoli.

U.S. Patent No. 3,869,387, 5 p, 3 tab, 4 ref; Official Gazette of the United States Patent Office, Vol 932, No 1, p 229, March 4, 1975.

Descriptors: *Separation techniques, *Patents, *Waste water treatment, *Phenols, *Pollutant abatement, Water pollution control, Water quality control, Ureas, Hydrogen ion concentration. Identifiers: Formaldehyde.

Phenol is extracted from waste waters in the form of urea-formaldehyde-phenol condensates. These etic resin products can be used as adhesives and binding agents. Formaldehyde, urea, and a waste water containing phenol in a concentration of about 0.01 to 5 wt.% are reacted for about 15 to 60 minutes at temperatures of about 60 to 95 deg C and a pH of about 9.5, the molar ratio of formaldehyde to phenol being from 2500:1 to about 100:1 and that of formaldehyde to urea about 2:1 to 2.7:1. A first reaction product is obtained with a viscosity of about 20 to 35 seconds measured at 25 deg C in a No. 4 Ford cup. The first reaction product is thereafter kept at temperatures of about 60 deg to 95 deg C and at a pH of about 4.0 to 5.5 for about 4 to 10 minutes to obtain a second reaction product. The second reaction product is thereafter reacted with additional urea and waste water containing phenol for about 60 to 240 minutes at temperatures of about 60 deg to 95 deg C and at a pH of about 5.7 to 6.8. The third reaction product is thereafter brought to a pH of about 8 and the urea-formaldehydephenol condensate formed is isolated. (Sinha-OEIS) W75-06682

TREATMENT OF WASTEWATER,

Autotrol Corp., Milwaukee, Wis. (assignee) W. N. Torpey

U.S. Patent No. 3,869,380, 6 p, 7 fig, 1 tab, 9 ref; Official Gazette of the United States Patent Office, Vol 932, No 1, p 227, March 4, 1975.

Descriptors: *Patents, *Oxidation, *Waste water treatment, *Biological treatment, Pollution abatement, Water pollution control, Carbon, Nitrogen, Slime, Denitrification.

Process and apparatus are described for the oxidation of carbonaceous and nitrogeneous matter in wastewater by use of a mixture of biologically active slimes attached to partially submerged rotating contactors. The biological contactors are mounted in a single-stage treatment unit and are supplied with wastewater at a controlled rate relative to the surface of the contactors and distributed evenly over the contactor surface. A denitrifying unit, located upstream from the single-stage treatment unit is supplied with wastewater and recirculated effluent from the singlestage treatment unit. The denitrifying unit utilizes biologically active slimes attached to rotating biological contactors for the removal of car bonaceous matter from the wastewater supported by nitrate oxygen from the recirculated effluent. (Sinha-OEIS) W75-06684

PROCESS FOR THE PURIFICATION OF SUL-FUR AND NITROGEN CONTAINING WASTE WATER AND WASTE GAS.

Deutsche Gold- und Silber-Scheidesnstalt A.G.,

Frankfurt-am-Mein (West Germany).
F. Geiger, T. Lussling, and W. Igert.
U.S. Patent No. 3,867,509, 4 p, 3 fig. 5 ref; Official Gazette of the United States Patent Office, Vol 931, No 3, p 1370, February 18, 1975.

Descriptors: *Patents. *Waste water treatment. *Waste treatment, Sulfur, Nitrogen, *Gases, *Water purification, Temperature, Alkalis(Bases), Hydrogen ion concentration. Identifiers: *Waste gases

*Waste gases, Alkaline earths, Chlorites

Waste waters and waste gases which contain oxidizable compounds can be quickly and quantitatively deodorized and detoxified, even in the presence of ammonia, free or as a compound, by treatment with alkali or alkaline earth chlorites in an acid medium. The treated waste water and waste gas can be emptied subsequently without further treatment into streams or the atmosphere. In general the waste water or waste gas is treated e temperature at which it occurs. However, it is suitable to carry out the reaction at elevated temperatures, e.g., at about 80 deg C. The process can be carried out either discontinuously or continuously in the usual stirring vessels. Any reactor can be used which guarantees a sufficiently thorough mixing, either by forced circulation or corresponding fixed immovable installations. For commercial processes the continuous forms of carrying out the invention are of primary interest since the process permits the establishment of a constant pH value by employing customary measuring and regulating devices and the supply of a fixed amount of chlorite dependent upon the condition of the waste gas and waste water. (Sinha-OEIS) W75-06690

PROCESS RM FOR PURIFYING INDUSTRIAL WASTE WATERS DISOPROPYL AMINE, CONTAINING

Zimmer A.G., Frankfurt am Main (West Germany), (assignee)

U.S. Patent No. 3,867,287, 4 p, 1 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 931, No 3, p 1316, February 18, 1975.

Descriptors: *Patents, *Industrial wastes, *Waste water treatment, Pollution abatement, Water pollution control, Separation techniques, *Water purification.

Identifiers: Diisopropyl amine, Amines, Air-liquid mixture, Air strea

A process for purifying industrial waste water containing undesired amounts of diisopropyl amine by the removal of the amine comprises contacting the waste water, in finely divided form, with a continuously renewed stream of air, and subsequently separating the resultant air and liquid mixture in a separation zone to produce a purified waste water. The waste water is passed through a multichamber container, each chamber provided with liquid jet air washers, several parallel waste water cycles are maintained through each chamber and the air flow is successively guided through liquid jet air washers provided for each individual chamber. (Sinha-OEIS) W75-06691

WATER TREATMENT WITH NITROGEN DIOXIDE

Kappe Associates, Inc., Rockville, Md. (assignee) S.E. Kappe, and D. S. Kappe.
U.S. Patent No. 3,867,284, 6 p. 3 ref; Official Gazette of the United States Patent Office, Vol 931, No 3, p 1315, February 18, 1975.

Descriptors: *Patents, *Waste water treatment, *Sewage treatment, Nitrogen compounds, *Organic matter, *Oxidation, Pollution abatement, Water purification, Water pollution control, Domestic wastes, Treatment. Identifiers: *Nitrogen dioxide.

A method of treating domestic sewage waste water comprises dissolving an effective amount of nitrogen dioxide in domestic sewage waste water containing as organic materials: bacteria, other

Waste Treatment Processes—Group 5D

fats, alcohols, microorganisms, aldehydes, carbohydrates with aldehyde ends, organic acids, ammonia, ammonium compounds, cellulose, primary amines, amino acids and urea. The effective amount of nitrogen dioxide is from 1 milligram to 50 grams per gram of organic material. The treated domestic sewage waste water is then discharged into a waterway. During the reaction, the pollutant is oxidized by the nitrogen dioxide. For example, nitrous oxide is generally not as powerful as nitric oxide as an oxidizing agent. Therefore, less nitric oxide will be required to oxidize the same pollutant. To treat the same pollutant, less nitrogen dioxide (NO2) is needed than if nitric oxide (NO) were used. Fourteen examples of ne method are presented. (Sinha-OEIS) W75-06693

METHOD AND APPARATUS FOR PREVENTING THERMAL POLLUTION,

Computer Sciences Corp., Los Angeles, Calif. (assignee)

J. A. Lahoud, and D. L. Orphal.

U.S. Patent No. 3,851,495, 4 p, 2 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 929, No 1, p 63, December 3, 1974.

Descriptors: *Patents, *Pollution abatement, *Waste water treatment, *Thermal pollution, *Water pollution control, *Cooling towers, Heated water, Water cooling, Electric powerplants, Industrial plants, Nuclear powerplants, Reservoirs.

Thermal pollution from industrial manufacturing and electric generating plants is avoided by incorporating in the water cooling system of such plants an underground water storage and heat dissipation space as formed by nuclear explosion. The system incorporates a wet type water cooling system (primarily because of its lower cost) and one or more nuclear chimneys below the level of the local aquifer or water table so that makeup water for water lost through evaporation in the wet type cooling unit is added by water draining or leaching to the nuclear chimney from the aquifer level. To prevent thermal pollution a large underground reservoir is formed. It has greater vertical dimension than horizontal dimension. The upper level of the reservoir is connected to the cooling unit to receive water. The lower end is connected to the industrial facility. Excess heat energy remaining in the water issuing from the cooling unit is dissipated in the earth. (Sinha-OEIS) W75-06694

CONTINUOUS BIOLOGICAL DENITRIFICA-

TION OF WASTEWATER, McMaster Univ., Hamilton (Ontario). P. M. Sutton, K. L. Murphy, and R. N. Dawson. Technology Development Report EPS 4-WP-74-6, 242 p, August 1974, Environment Canada, Environmental Protection Service, Water Pollution Control Directorate. 44 fig, 88 ref, 40 tab, 4 ap-

Descriptors: *Denitrification, *Nitrates, *Feasibility studies, Pilot plants, Laboratory tests, Analytical techniques, *Waste water treatment, Evaluation, *Biological treatment. Identifiers: Packed column reactors, Stirred tank

The feasibility of using continuous microbial denitrification for nitrate removal from municipal waste-water over a wide range of temperatures is examined. Both pilot plant upflow packed column reactors and a stirred tank reactor were investigated. Low temperature effects on the process were of major concern. The temperature lependency of the denitrification rate was shown to follow on Arrhenius relationship between 5C and 25C in both the packed column and stirred tank reactor systems. At 5C, 10-12 mg/l of nitrate as N were removed from a municipal nitrified sewage effluent provided a minimum sludge age of 6 days was maintained in the stirred tank reactor.

The nitrate removal in the packed column units was defined as a function of detention time and packing surface area available for bacterial growth and was found to exhibit a slightly less temperature sensitivity compared to the stirred system. Unit denitrification rates determined from batch, stirred tank reactor studies were not significantly different from rates arrived at during continuous flow studies at the same sludge age. Solids yields from the stirred tank system did not vary at the 3 day and 6 day sludge ages. It was demonstrated that closed nitrogen balances could be performed on both the stirred tank and packed column reactors to account for the bacterial conversion of nitrate to nitrogen gas. (Environment W75-06734

OPERATIONAL EXPERIENCE WITH A BASE METAL MINE DRAINAGE PILOT PLANT,

Department of the Environment, (Ontario). Wastewater Technology Centre. P. M. Huck, B. P. Le Clair, and P. W. Shibley Technology Development Report EPS 4 WP-74-8, 34 p, September 1974, Water Pollution Control Directorate. 7 ref, 3 fig, 10 tab.

*Waste Descriptors: water treatment. Flocculation, Heavy metals, Technology, Pilot plants, Effluent quality, Research and development, Pollution abatement, Lead, Zinc, Copper, Iron, Equipment, Operations, Mine wastes. Identifiers: *Base metals, *Sludge handling, *Effluent polishing, New Brunswick, Mining in-

The development and effectiveness of waste treatment processes for base metal mining wastes are described. The establishment of a pilot plant at Brunswick Mining and Smelting Corporation's 12 Mill in Northeastern New Brunswick is detailed and the results of tests using three minewaters of varying strength are reported. Polymeric flocculation, sludge recycling, and various polish-ing techniques were utilized. The strength of the influent had little effect on effluent quality. Effluent metal concentrations attained were: MG/L for lead, 0.6 MG/L for zinc, 0.1 MG/L for copper, and 0.6 MG/L for iron. (Environment Canada) W75-06735

MANAGEMENT IMPROVEMENT.

Jacksonville Dept. of Public Works, Fla. Water and Sewer Div.

Team report, March 20, 1972. 101 p, 6 fig, 11 append.

Descriptors: *Sewerage, *Urban drainage, Sewage disposal, *Water distribution(Applied), Water districts, *Drainage systems, Planning, Combined sewers, Water management(Applied), *Florida, Water control. Identifiers: *Jacksonville(Fla).

Conversion of Jacksonville's obsolete water and sewer works into an efficient system meeting ecological standards and laws may cost \$400 million by 1990. After a thorough inventory of the system and present facilities, publications, con-tracts, ordinances and past studies relating to the control of the system and the funding process, this study sets forth recommendations for management, operations and development of an efficient program. One proposal is to designate one activity and one individual in the Director's office to have responsibility of monitoring all financial transactions. Other recommendations include the stabilization of the newly altered organizational structure of the Public Works Department. With a more effective management, improvements to the system are facilitated. This includes (1) conversion of a 5-year capital improvement plan to a more viable planning document, (2) publication of quarterly reports, (3) increased dissemination of information and formalized record keeping, (4) creation of a permanent industrial waste control activity, (5) bimonthly billing, (6) upgrading of acquired facilities, and (7) the employment of qualified water and sewer system managers. (Salzman-North Carolina) W75-06760

WATER AND SEWER SYSTEMS PROGRAM AND DEVELOPMENT, FIVE-YEAR CAPITAL IMPROVEMENT PLAN: OCTOBER 1, 1972 -**SEPTEMBER 30, 1977.**

Jacksonville Dept. of Public Works, Fla March, 1972, 93 p.

Descriptors: *Sewerage, *Water manage ment(Applied), *Drainage systems, Water works, Water distribution, Bond issues, *Costs, *Government finance, Participating Grants, *Florida, Water control, Economic efficiency

Identifiers: *Jacksonville(Fla), Tributary laterals, Trunk systems.

An improvement of the plan of 1971, this report forms a basis for shaping a master municipal system serving the entire Jacksonville area and provides for project enumeration to the year 2000 with an ultimate construction cost of \$2.2 billion. Funds for construction of individual projects are requested for the year cash payments will be dispersed, with reimbursement expected from the federal government in later stages of the plan. Due to the greater cost in installation of tributary laterals (individual connections), this plan provides studies to implement trunk (group) treatment sewerage systems in the unsewered areas of Jacksonville. Program flexibility is hindered by constraints imposed by the pollution requirements of the Florida Administration Codes. Recommendations for project financing are by revenue bonds and special assessments. The water and acquisition programs, compared to the sewer, are limited in nature. The sewer programs are detailed, listing specific improvements to present facilities, acquisition of other facilities and construction of new facilities. (Salzman-North Carolina) W75-06762

CLEAN WATER A NEW DAY FOR SOUTHEAST MICHIGAN, Detroit Metro Water Dept., Mich.

F. R. Janeczk.

Detroit Metro Water Department, December, 1973. 16 p, 9 fig, 4 tab, 11 plates.

Descriptors: *Michigan, *Waste water treatment, *Water quality, *Sewage treatment, *Water pollu-tion, Oxidation, Aeration, Municipal wastes, Industrial wastes, Waste treatment, Waste disposal, Reaeration, Settling basins, Water reuse,

Phosphorous.
Identifiers: *Detroit(Mich). Ferrous chloride.

Since 1966, \$239 million of the \$700 million improvement program of the Detroit Metro Water Department (DMWD) has been completed so that Michigan and federal water quality standards can be met. Forty-one miles of regional interceptors. storm-water overflow control facilities, and wastewater treatment plant expansion have been completed, providing a 1200 mgd capacity. Ferrous chloride, a steel processing waste, is used to precipitate phosphorous. Oxygen, preduced in an on-site cryogenic process plant, is used in deep covered activated sludge tanks which are more than twice as fast as conventional tanks. Secondary clarifiers are of a patented high-overflow peripheral inflow and discharge design. Scum from primary clarifiers is burned in a water hearth furnace. Dewatered sludge is incinerated in a large multiple-hearth furnace. Air pollution control in both furnaces uses reclaimed process water. Over 60 firms have installed pretreatment facilities at their plants to reduce the load the pollutants sent on to DMWD facilities so that hazardous and toxic wastes are no longer being dumped into the river

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by these firms. DMWD results include 80% removal of solids, BOD, oil, and phosphorous, and 70% removal of phenols. After chlorination, and 07% removal of phenois. After cholmatory, treated water of swimming beach quality is discharged to the Detroit River. There has been a significant increase in sport fishing in the area and decreasing eutrophication of Lake Erie. (Herr-North Carolina) W75-06763

COLORADO RIVER SALINITY, NEW SOLU-TIONS TO AN OLD PROBLEM. For primary bibliographic entry see Field 5G.

PROSPECTUS FOR REGIONAL SEWER AND WATER PLANNING.

Southwestern Wisconsin Regional Planning Com-

mission. Platteville.

Available from the National Technical Informa stron Service, Springfield, Va 22161 as PB-231 712, \$10.00 in paper copy, \$2.25 in microfiche. Technical Report No. 2, January 1971. 20 p, 1 tab, append. CPA-1003-720-77.

Descriptors: *Sewers, *Sewage, *Waste water disposal, *Drainage systems, *Water requirements, Waste disposal, Planning, *Wisconsin, Water quality. Identifiers: Grant County(Wis), Green Coun-

ty(Wis), Iowa County(Wis), Lafayette County(Wis), Richland County(Wis).

Purpose is to establish the need for an areawide sewer and water planning program, recommend the most effective method for establishing, organizing and accomplishing the required work ele-ments, and provide enough data to permit develop-ment of an initial budget for rural Grant, Green, Iowa, Lafayette and Richland Counties in Southwestern Wisconsin with a combined population of about 126,000. Except for Grant, each county is losing population. Platteville City with 9,615 is the largest population center. Only Iowa and Lafayette Counties have prepared water and sewer plans within the past few years. Some communities still have no public systems and major improvements are needed for others. Lack of adequate facilities points to need for a regional sewer and water plan to critically evaluate the in-ventory of existing facilities and coordinate their improvement with proposed systems. The extent of deterioration of surface water quality, potential development of small private systems, determination of costs of replacing septic tanks with public sewers and need to coordinate facility construction are discussed. Objectives need to be selected and then translated into standards for system and facility design and water quality management. To provide a regional inventory, maps, background studies, analysis of soils data, economic activity and existing water and sewer systems, and forecasts of economic activity and population must be undertaken. Alternative staffing arrangements to carry out the proposed study should be explored. A planning period of two or three years is anticipated. (Hufschmidt-North Carolina)

URBAN SYSTEMS ENGINEERING DEMONSTRATION PROGRAM FOR HINDS, MADIS-ON, RANKIN COUNTIES, MISSISSIPI VOLUME I: AREA-WIDE WATER SYSTEMS. Clark, Dietz and Associates, Inc., Jackson, Miss Prepared for Hinds, Madison, Rankin, Capital City Council of Governments and Pearl River Basin Development District, Final Report, No. USE-COG-73-1, June, 1973. 150 p. 11 fig. 26 plates, 40 tab. 9 append. USE-MS-04-25-0003. USE-MS-04-00-0002.

Descriptors: *Mississippi, *Water supply, *Water storage, *Water requirements, *Water manage-ment(Applied), City planning, Water distribu-tion(Applied), Water quality, Water treatment, tion(Applied), Water quali Water rates, Water demand.

Identifiers: *Jackson(Miss), Urban demonstration programs, Hinds County(Miss), Madison County(Miss), Rankin County(Miss), Water systems, Capital City Council of Governments(Miss), Pearl River(Miss), Ross Barnett Reservoir(Miss)

The goal of the three county area is to conserve water resources by the most efficient and cost-effective method of supplying water to meet anticipated needs (1971 through 1991). Water supply consists of five major aquifers and the Pearl and Big Black Rivers. Jackson uses the Pearl River, currently appropriating 72,000,000 gallons per day, and the smaller areas are served by wells. Normal maximum demands are expected to increase from 59.3 million gallons/day (MGD) in 1976 to 89.9 MGD in 1991 in the Jackson urban area system. Rural and smaller systems pose no problems but consolidation is proposed for the systems in the Jackson urban area with primary purpose to treat water of the Pearl River and distribute it to the in-dividual system as its needs require. Facilities construction projects would cost \$36,640,000, over twenty years, consisting of a 30 MGD water treatment plant, a major transmission main, completion , 20-, and 16-inch loop lines in western Rankin County, two 5,000,000 gallon ground storage tanks, two high level systems with booster pumps and 1,000,000 gallon elevated storage tanks. The City of Jackson is recommended to implement the plans, and revenue bonds are proposed as the funding mechanism. (Park-North Carolina) W75-06783

URBAN SYSTEMS ENGINEERING DEMONSTRATION PROGRAM FOR HINDS, MADISON, RANKIN COUNTIES, MISSISSIPPI, VOLUME II: AREA-WIDE SANITARY SEWER SYSTEM.

Clark, Dietz and Associates, Inc., Jackson, Miss. Prepared for Hinds, Madison, Rankin, Capital City Council of Governments and Pearl River Basin Development District, Final Report, No. USE-COG-73-2, June 1973. 122 p. 7 fig. 20 plates, 45 tab, 4 append. USE-MS-04-25-0003. USE-MS-04-00-0002.

Descriptors: *Waste water treatment, *Waste water disposal, *Sanitary engineering, *Sewage disposal, Treatment facilities, *Sewage treatment, *Sewerage, Sewers, Sewage lagoons, Sewage districts, Sewage effluents, *Mississippi, Bio-chemical oxygen demand, Activated sludge, Aerated

*Jackson(Miss), Identifiers: Rankin ty(Miss), Madison County(Miss), Hinds County(Miss), Capital City Council of Governments(Miss), Pearl River(Miss), Urban Demonstration Programs, Contact stabilization

Present practices and alternative plans to meet future sanitary sewer needs of the three counties composing the Jackson Metropolitan Area are analyzed including an inventory of existing facili-ties, present and future waste flows (seven basins in the cities of Jackson and Clinton will increase substantially), description of water quality stan-dards and uses, different wastewater treatment dards and uses, different wastewater freatment techniques and costs, and sewer system analysis. Proposals are divided into collection and transport and treatment sections. Estimated costs of proposed projects, i.e. extending interceptor lines and building a 1 MGD treatment plant plus one 5.0 MGD pump station and a 1.0 MGD pump station, in the two collection areas (East and West Bank Sewer Districts) are divided into four five year increments (1971-1991) totalling \$21,412,000. Transport and treatment costs along both banks of the Pearl River were developed with three alternatives. Alternate I using present interceptors is considered the most cost-effective plan, having the advantage that it can be phased so that more areas can be served during the earlier years of the study can be served uning the carber years of the study period. Financing proposals consider local revenue bonds, and State and Federal (72% fund-ing) grants. The City of Jackson was suggested as the single implementation agency. (Park-North Carolina)

W75-06784

URBAN SYSTEMS ENGINEERING DEMON-STRATION PROGRAM FOR HINDS, MADIS-ON, RANKIN COUNTIES, MISSISSIPPI, VOLUME IV. AREA-WIDE STORM DRAINAGE AND FLOOD PLAIN MANAGEMENT STUDIES. Clark, Dietz and Associates, Inc., Jackson, Miss. Prepared for Hinds, Madison, Rankin, Capital City Council of Governments and the Pearl River Basin Development District, Final report No. USE-COG-73-4, June 1973. 175 p. 74 fig. 150 tab. USE-MS-04-25-0003. USE-MS-04-25-0003, USE-

Descriptors: *Storm drains. *Storm runoff. Storm water, Flood plains, *Flood plain zoning, *Flood protection, Drainage districts, *Drainage systems, Drainage, Drainage area, Drainage water, *Mississippi.

Water, Mississippi.
Identifiers: *Jackson(Miss), Hinds County(Miss),
Madison County(Miss), Rankin County(Miss),
Capital City Council of Governments(Miss), Pearl River(Miss).

Based on inventories of existing facilities and prevailing conditions and analysis of needs to 1992, requirements to provide adequate drainage are given for each basin and town along with cost estimates. Four of the eighteen basins and one town, Canton, would have substantial damage in a 50 year flood due to inadequate facilities. Plans call for channel improvements, and maintenance erosion control, right-of-way acquisition, and upgraded or new drainage structures. Staging of program is suggested in four five year increments to 1993. Flood information studies have been conducted for five basins, Purple Creek (1968), Lynch Creek (1971), Cany Creek (1969), Richland Creek (1967), and Town Creek (1969). Greatest floods on record occurred in 1953 and 1961. The plan recommends studies of all waterways as present studies are an inadequate basis for an area-wide management program. A flood plain ordinance is presented as well as implementation measures involving the extensive costs of easements acquisition for drainage courses. Since local governi units cannot now require developers and builders to dedicate necessary easements, enabling legisla-tion should be enacted. A Storm Drainage Commission composed of citizens representing units of local government is suggested to coordinate area-wide proposals. (Park-North Carolina) W75-06785

GROUND WATER POLLUTION FROM SUBSURFACE EXCAVATIONS PART VI DISPOSAL WELLS.

Environmental Protection Agency, Washington,

Water Well Journal, Vol 38, No 9, p 83-87, September, 1974.

Descriptors: *Injection, *Pollutant identification. *Water pollution, Groundwater recharge, Path of pollutants, Pollutants, Thermal pollution, Arizona, California, Idaho, New York. Identifiers: Snake River Plain(Idaho), Long Island(N.Y).

Many thousands of the estimated fifteen million

fresh water wells in the United States are for disposal of brines, chemical wastes or domestic usposa of ormes, chemical wastes of domestic sewage effluent, which are pollutants of fresh water. Initially, injection of contaminated liquids through wells into fresh water aquifers causes degradation of the chemical and bacteriological quality of the ground water in the immediate vicinity of the injection site. Eventually, the degradation spreads and may reach surface waters hydraulically connected to the contaminated nydrauncany connected to the contaminated aquifer. Cooling water, storm-water runoff, industrial wastes and domestic sewage are the principal contaminants. The rate of injection is governed by the parameters for withdrawal rates, plus the effect of the chemical compatibility of the injected

fluid with the native ground water. The first step to control potential ground water pollution is a detailed hydrogeologic investigation, then, a moni-toring system should be designed and implemented to provide continuing surveillance of polluted water and of the efficiency of any control mea-sures. (See W75-06813 and W75-06814) (Bradbeer-W75-06812

GROUND WATER POLLUTION FROM SUBSURFACE EXCAVATIONS, PART VII, PITS AND LAGOONS.

Environmental Protection Agency, Washington, D.C.

Water Well Journal, Vol 28, No 10, p 53-55, October, 1974.

Descriptors: *Lagoons, *Pits, *Water pollution sources, Seepage, Leakage, Permeability, Water-tight, Legal aspects, Regulation, Cadmium, Waste disposal, *Waste water treatment. Identifiers: Nassau County(NY), Public Law 92-

500. Pretreatment of waste

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Data by which to evaluate the existing scope of the problem of municipal and industrial waste lagoons and similar open excavations in relation to ground water quality have not been assembled and analyzed. The need for such an assessment will become greater with time. A continuously inun-dated soil soon clogs to the extent that the infiltra-tion rate is reduced below the minimum for an acceptable infiltration system, so that resting of sewage ponds is necessary. Clogging can also hap-pen when the ground surface water is too close to the lagoon bottom and surface tension supports the water column and resists drainage. Percolating ids from industrial pits have a greater potential to degrade ground water than does domestic sewage, and few storage ponds have been designed with proper consideration to water tightness. In many cases knowledge of the pollution does in many tases knowledge of the point tion does not come until a natural ground water discharge area is reached by the waste water plume. Methods of control include the pretreat-ment of wastes, better lining techniques, use of barrier wells, banning the use of pits, or localizing the approach to individual pits. Monitoring is essential to any such regulations. (See also W75-05812) (Bradbeer-NWWA)

GROUND WATER POLLUTION FROM SUB-SURFACE EXCAVATIONS, PART VIII SEPTIC SYSTEMS.

Environmental Protection Agency, Washington, D.C

Water Well Journal, Vol 28, No 11, p 53-56, November, 1974.

Descriptors: *Septic tanks, *Cesspools, *Waste disposal, Sewage treatment, Domestic wastes, Groundwater, Water pollution, *Hawaii, Disposal, Protection, Water law, Water policy, Political con-straints, *Wastewater treatment.

systems are prevalent throughout the United States, the heaviest concentration being in suburban subdivisions developed following World War II and in recreational lake development. The predominant type of system is the individual household septic tank. Although the septic tank with an associated subsurface percolation system is the most commonly used type, raw sewage is still discharged directly from the plumbing system into cesspools dug in the ground. The practice is no longer approved for new installations. The basis design of a septic tank is described and regional (climatic) variations are exemplified. Two categories of environmental effects which bear on control measures were identified as: (1) those which lead to restrictions on the use of septic systems, and (2) those which are inherent in a properly designed and well-functioning system in suitable soil. The failure of percolation systems,

the direct discharge of waste to ground water through natural drainage systems and the location of a shallow biological zone which can be completely missed in the placement of septic systems are three of the situations in the first category. Control methods are civided into three situations, (1) those for existing systems, (2) new installations, and (3) where no practical alternative is feasible. Methods of dealing with these three categories are described. (See also W75-06812) (Bradbeer-NWWA)

SET PROBE OF POLLUTION CONTROL AMENDMENTS.

For primary bibliographic entry see Field 5G. W75-06827

AERATING EFFLUENT AND KEEPING SLUDGE IN SUSPENSION. Netherlands Patent 57251V/32. Issued July 31,

1974. Derwent Netherlands Patents Reports, Vol. 5, No. 33, p. 2, September 24, 1974.

Descriptors: *Waste water treatment, *Patents, Equipment, *Aeration, *Effluents, Sludge, Suspension, Jets, Flow, Activated sludge, Sludge treatment, Suspended load, Suspended solids.

Effluent is aerated and activated sludge is maintained in suspension by jets of water obliquely striking the surface. The vessel is circular, elliptical, or polygonal in shape and of constant crosssection through the greater part of its height. The jets strike the surface at not more than 60 degrees, preferably 10 to 20 degrees to the surface with a speed of 3 to 12 m/sec. The horizontal component of the tangent is in the general direction of flow. (Prague-FIRL) W75-06832

SOLID BOWL CENTRIFUGAL SEPARATOR. W. H. Peck, and S. A. Collier.

U.S. Patent 3,829.009. Issued August 13, 1974, Official Gazette of the United States Patent Office, Vol 925, No 2, p 514, August, 1974. 1 fig.

Descriptors: *Patents, *Centrifuges, *Slurries, *Solids, Equipment, *Waste water treatment, Separation techniques.

A centrifugal separator for the removal of solids from slurry was described. A high speed bowl rotates about a vertical axis and is centrally fed with slurry in its upper region. A circular ceiling plate above the level of slurry feed establishes a narrow annulus with the cylindrical upper rim section of the bowl. This becomes sealed with sludge as the solid constituents build up in the vicinity. A series of plows advance slowly around the annulus and through the sludge seal and elevate the sludge above the ceiling plate, into the path of a series of rotatable buckets. These buckets assume outside ecliptic positions where they scoop wads of sludge from the sludge seal, and assume inside ecliptic positions where their directional relationship is reversed so that centrifugal force dislodges the wads, causing them to be flung radially over the rim of the bowl. The liquid constituent of the slurry is then forced out through an outlet in the bowl bottom wall. (Prague-FIRL) W75-06835

POROUS CERAMIC SOIL MOISTURE SAM-PLERS, AN APPLICATION IN LYSIMETER STUDIES ON EFFLUENT SPRAY IRRIGATION. Department of Agriculture, Lethbridge (Alberta). For primary bibliographic entry see Field 2G.

W75-06843

5E. Ultimate Disposal Of Wastes

SUBSURFACE WASTE DISPOSAL BY INJEC-TION IN HAWAII: A CONCEPTUAL FORMU-LATION AND PHYSICAL MODELING PLAN, Hawaii Univ., Honolulu. Water Resources Research Center. For primary bibliographic entry see Field 5B. W75-06351

NEW CONCEPTS IN SOIL SURVEY IN-TERPRETATIONS FOR ON-SITE DISPOSAL OF SEPTIC TANK EFFLUENT, Wisconsin Univ., Madison. Dept. of Soil Science. For primary bibliographic entry see Field 5D. W75-06402

AND **ENVIRONMENTAL** ECONOMIC EVALUATION NUCLEAR OF WASTE UNDERGROUND IN SITU DISPOSAL BY

California Univ., Livermore, Lawrence Livermore Lab. For primary bibliographic entry see Field 5B.

W75-06413

RECLAMATION OF ENERGY FROM OR-GANIC WASTES.

Illinois Univ., Urbana. Dept. of Civil Engineering. For primary bibliographic entry see Field 5D. W75-06471

DEVELOPMENT OF CRITERIA TO CONTROL OCEAN DUMPING - EXECUTIVE SUMMARY. Interstate Electronics Corp., Anaheim, Calif. Oceanics Div.

Available from the National Technical Informa tion Service, Springfield, Va 22161 as PB-233 018, \$3.25 in paper copy, \$2.25 in microfiche. (1974). IEC 4460C1612. 16 p, 4 fig. EPA Contract 68-01-

*Waste Descriptors: disposal, *Reviews, Atlantic Ocean, Pacific Ocean, Gulf of Mexico, Maps, Bibliographies, Waste dumps, *Water quality standards. Identifiers: *Ocean dumps

Brief summaries of eight reports previously published under this contract were presented. These reports all concern ocean waste disposal, and have the following titles: 'Directory of Managers, Engineers and Scientists in Ocean Waste Disposal and Related Environmental Science Fields'; 'A Bibliography on Ocean Waste Disposal'; 'Ocean Waste Disposal in Selected Geographic Areas'; 'Ocean Waste Disposal in the York Bight'; 'Ocean Waste Disposal Practices in Metropolitan Areas of California'; 'An Atlas of Ocean Waste Disposal Sites'; 'Navigation Aids for Ocean Waste Disposal Control'; 'Guidelines for Development of Criteria for Control of Ocean Waste Disposal.' (Sims-ISWS)

STORM RUNOFF AND TRANSPORT OF RADIONUCLIDES IN DP CANYON, LOS ALAMOS COUNTY, NEW MEXICO, Los Alamos Scientific Lab., N. Mex For primary bibliographic entry see Field 5B. W75-06636

IMPACT OF HUMAN ACTIVITIES ON THE QUALITY OF GROUNDWATER AND SURFACE WATER IN THE CAPE COD AREA, Massachusetts Univ., Amherst. Water Resources

Research Center. For primary bibliographic entry see Field 5B. W75-06644

Group 5E—Ultimate Disposal Of Wastes

DIGESTED SLUDGE DISPOSAL AT SAN DIEGO'S AQUATIC PARK,

San Diego Dept. of Utilities, Calif. R. E. Graham, and R. E. Dodson.

Paper presented at 41st Annual Conference of the Water Pollution Control Federation, Chicago, Illinois, September 22-27, 1968. 16 p, 5 ref.

Descriptors: "Sludge disposal, "Land reclamation, "Agricultural engineering, "Sludge digestion, "Sludge treatment, "Waste water disposal, Sludge, Waste water treatment, Liquid wastes, Waste dumps, Waste disposal, Sewage treatment, California, Irrigation practices, Soil management, Land development, Soil conservation. Identifiers: San Diego(California).

Field studies and large-scale production programs at San Diego over the past 13 years have proven the effectiveness of soil building by the application of liquid digested sludge to potential growing areas, which are basically sand, both for farm production and for park development. The rapid creation of a heavily used park in sterile sand had been particularly effective. Most major problems were due to the engineering failures in the transmission facilities, and with proper handling of the liquid sludge at the disposal sites. Odor control has been a problem because of the growing population pressures surrounding the disposal area. Present practice is to spread the liquid sludge on leveled sand beds in lifts of not over 1 to 2 in. (2.5 to 5 cm), to flush the delivery pipeline with supernate after every day's pumping, and to pump the accumulated supernate to a trunk sewer for return to the treatment plant. Odor is controlled by the use of a systemic masking agent and by cessation of pumping during occasional adverse wind conditions. Insects are controlled by working the disposal area and by use of insecticide sprays. On a dry weight basis cost was \$6.76/ton or \$4,730/acre. (Poertner) W75-06674

SUBSURFACE DISPOSAL OF WASTE IN CANADA - II, DISPOSAL-FORMATION AND INJECTION-WELL HYDRAULICS,

Department of the Environment, (Ontario). Water Resources Branch. R. O. Van Everdingen.

Technical Bulletin 78, Inland Waters Directorate, 1974. 12 fig. 10 tab, 15 ref. 30 p.

Descriptors: *Waste disposal, *Injection wells, *Underground waste disposal, Hydraulics, Model studies, Permeability, Aquifers, Pressure, Equations, Mathematical studies, Base flow, Flow rates, *Canada. Identifiers: Fracturing

Injection-well and disposal-formation hydraulics are examined as they relate to the selection of sites for subsurface disposal of liquid wastes. Pressure build-up in the disposal formation may cause reactivation of abandoned oil, gas, or water wells and an increased rate of discharge which may result in the eventual discharge of the waste materials, perhaps even after the injection well is no longer operating. Models using computers can be used to predict the effects of subsurface disposal and several mathematical models are described. Equations useful for determining pressure build-up are developed and factors which can affect the build-W75-06751) up are discussed. (See also (Environment Canada) W75-06750

SUBSURFACE DISPOSAL OF WASTE IN CANADA - III - REGIONAL EVALUATION OF POTENTIAL FOR UNDERGROUND DISPOSAL OF INDUSTRIAL LIQUID WASTES, Water Resources Branch.

R. O. van Everdingen.

Technical Bulletin No 82, 42 p, 1974, Inland Waters Directorate, 7 fig, 27 ref, 6 tab.

Descriptors: *Industrial wastes, *Underground waste disposal, *Waste disposal, Injection wells, Geology, Hydrodynamics, Liquid Canada

Identifiers: *Site evaluation, *Site selection, Hydrochemistry, Criteria, Waste classification.

A regional analysis of potential sites for un-derground disposal of industrial wastes is presented. The criteria to be used in site selection hydrochemistry, man-mane from underground These include discussed. hydrodynamics, hydrochemistry, hazards, and separation from resources such as groundwater or minerals. The criteria are then used to identify regions in Canada that should not be used for subsurface disposal and to indicate certain regions that hold potential for safe injection of noxious wastes. Eight areas ranging from the Maritime plain to the Arctic ranging from the Mariume plant to the lowlands are designated as potentially suitable for injection wells. (See also W75-06750) injection wells. (See also (Environment Canada) W75-06751

A NEW DAY FOR CLEAN WATER . SOUTHEAST MICHIGAN, Detroit Metro Water Dept., Mich. For primary bibliographic entry see Field 5D.

SOLID WASTE DISPOSAL AND OCEAN DUMP-

Naval War Coll., Newport, R.I. For primary bibliographic entry see Field 5B. W75-06789

GROUND WATER POLLUTION FROM SUB-SURFACE EXCA DISPOSAL WELLS. **EXCAVATIONS**

Environmental Protection Agency, Washington, For primary bibliographic entry see Field 5D. W75-06812

GROUND WATER POLLUTION FROM SUB-SURFACE EXCAVATIONS, PART VII, PITS AND LAGOONS.

Environmental Protection Agency, Washington, D.C.

For primary bibliographic entry see Field 5D. W75-06813

GROUND WATER POLLUTION FROM SUBSURFACE EXCAVATIONS, PART VIII SEPTIC

Environmental Protection Agency, Washington, D.C. For primary bibliographic entry see Field 5D. W75-06814

DVE AND DROGUE STUDIES OF SPOIL DISPOSAL AND OIL DISPERSION. Delaware Univ., Newark. Coll. of Marine Studies. For primary bibliographic entry see Field 5B. W75-06831

5F. Water Treatment and **Quality Alteration**

REMOVAL OF IRON AND MANGANESE FROM LOW ALKALINITY WATERS, Mississippi State Univ., Mississippi State.

L. R. Robinson, and E. D. Breland Public Works, February 1968. p 72-76, 1 fig, 4 tab, 16 ref.

Descriptors: *Iron, *Manganese, *Municipal water, *Water treatment, *Alkaune water *Oxidation-reduction potential, Water quality con-*Water treatment, *Alkaline trol. Water pollution treatment. Iron oxides.

Bicarbonates, Alkalinity, Aeration, Sedimenta-tion, Filtration, Water supply, Treatment facili-ties, Water purification, Pilot plants. Identifiers: *Iron removal, *Manganese removal.

Iron removal from low alkalinity waters have proven difficult. Oxidation rates for the ferrous iron are so slow that it is economically impossible to design treatment plants using only aeration. Chemical treatment must also be used. A major study was conducted to find the factors which retard the rate of oxidation of ferrous iron and manganese in ground water supplies in Mississippi and Alabama. Pilot plant and oxidation studies were set up. Researchers found that iron removal by aeration, sedimentation, and filtration is difficult in water having bicarbonate alkalinities of less than 50 mg/l as CACO3. The apparent cause if the failure of ferrous iron to oxidize. Ferrous iron oxidation rates can be increased by raising the bicar-bonate alkalinities by the addition of soda ash. The increases in oxidation rates in these studies were due almost entirely to the increases in bicarbonate alkalinity. Raising the pH of the water above 8.5 by adding lime permits satisfactory iron removal. Increases in bicarbonate alkalinities increase oxidation rates and removal of manganese slightly. Effective oxidation and removal of manganese can be accomplished by aeration, sedimentation and filtration if the pH is raised to above 9.0 with the addition of lime. Organic material has no apparent effect on oxidation rates of ferrous iron and manganese. (Poertner) W75-06660

PHOTOSYNTHETIC DIFFICULTIES IN AN IRON REMOVAL PLANT,

Irwin and Summerford, Hot Springs, Ark. C. R. Summerford, and L. R. Robinson. Water and Sewage Works, September 1970. p 311-318, 2 tab, 7 fig, 8 ref.

Descriptors: *Iron, *Water treatment, *Municipal water, *Photosynthetic bacteria, *Water quality control, *Iron oxides, Photosynthesis, Filtration filters, Chlorination, Water pollution treatment, Treatment facilities, Photosynthetic oxygen. Identifiers: *Iron removal.

Persistent biological growths in the aerator, contact basin and filters have caused considerable difficulties in the operation of the iron removal plant for the city of West Helena, Arkansas. The study of the water treatment plant had three objectives. The first was to study the causes of the persistent biological growths. The second was to examin several possible methods of controlling these growths. Finally, the third was to determine if the growths. Finally, the third was to determine it the organic growths were interfering with the primary plant function of iron removal. Both the West Helena water treatment plant and a pilot plant were used. The pilot plant was used to see if biological growth would develop in a clean plant at the same rate as the main plant. In the main plant, the experimental modification consisted of covering one filter with a block plastic and applying air with the backwash water to another filter. alterations which were tried seemed to aid in controlling the biological growths, but not one single method nor any combination, eliminated the growths. The present control practice of superchlorination was required in addition to all the alterations made for the purpose of this study. After this study, it appears that the most effective way to eliminate the biological growths would be to cover all the exposed processes. (Poertner) alterations which were tried seemed to aid in con-W75-06661

IRON REMOVAL IN HIGH SILICA GROUND-

Jordon and Associates, Camp Hill, Pa. Environ-

mental Engineering Div. L. R. Robinson.

Paper presented at a Specialty Conference on Environmental Engineering Research, Development and Design, Pennsylvania State University, University Park, July 9, 1974. 22 p. 10 tab.

WATER QUALITY MANAGEMENT AND PROTECTION—Field 5

Water Quality Control—Group 5G

Descriptors: *Hardness(Water), *Water chemistry, *Iron, *Groundwater, *Silica, *Water quality control, Water pollution treatment, Iron oxides, Alkalinity, Bicarbonates, Alkaline water, Iron compounds, Chemical engineering, Chemical precipitation.
Identifiers: *Iron removal.

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Aeration and filtration processes use oxygen in oxidizing ferrous iron to the insoluble ferric state. This oxidation and ensuing precipitation forms the basis for most iron removal processes. Aeration, to provide the oxygen required for iron oxidation, reaction time and sedimentation, followed by filtration provides the nucleus for most groundwater iron removal plants. This basic scheme, however, does not always provide for satisfactory iron removal efficiencies. In water which contain organic matter, iron removal interference has been attributed to the presence of humic acids. In waters where organic concentrations are insignificant, the oxygen concentration, alkalinity and/or pH are factors which are frequently mentioned as those which have the greatest effect on iron oxidation, precipitation and removal. Recent studies have indicated that interference with iron oxidation and removal is frequently attributable to low pH and low alkalinity concentrations. Other reports have indicated that high concentrations of silica can catalyze ferrous iron oxidation and retard hydrolysis of ferric iron and thus hinder sedimentation and filtration. This study indicates that silica interference with iron removal is apparently silica reacting in alkalinity determinations to in-dicate sufficiently high bicarbonate alkalinity concentrations to insure rapid ferrous iron oxidation. Lime or soda can promote iron removal. (Poertner) W75-06663

SYSTEM FOR DEMINERALIZING WATER BY ELECTRODIALYSIS.

A. R. Tejeda

U.S. Patent No. 3,869,376, 9 p, 7 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 932, No 1, p 226, March 4, 1975.

Descriptors: *Patents, *Demineralization, *Ion exchange, *Water treatment, *Electrodialysis, *Permselective membranes, Distillation, Membranes, Separation techniques, Effluent, Desalination, Waste water treatment. Identifiers: Flow patterns, Soft water.

The electrodialytic demineralization of water is achieved by passing soft water through a treating chamber defined by a pair of permselective membranes of which the one closer to the cathode of the cell is cationic permselective and the one closer to the anode is anionic permselective. The chamber is charged with an ion exchange material. The effluent from the treating chamber may be passed through a second treating chamber. The ion exchange materials with which the cell or cells are charged may be cationic, anionic, both cationic and anionic, or cationic in one chamber and anionic in another chamber where more than one anionic in another channer white and treating chamber is employed. The particular types of ion exchange materials selected will depend the flow pattern and arrangement of chambers the flow pattern and arrangement of chambers. bers is in different electrodialytic cells. (Sinha-W75-06685

THE SORPTION OF FLUORIDE ION WITH SPECIAL REFERENCE TO FLU REMOVAL FROM POTABLE WATERS, FLUORIDE North Dakota Univ., Grand Forks. P. W. West.

MSc thesis 1936, 24 p, 10 fig, 2 tab, 19 ref.

Descriptors: Water quality, Chemical analysis, Chemical wastes, *Potable water, *Fluoride, *North Dakota, *Waste treatment. Identifiers: Fluoride removal.

The significance of fluorides in drinking water, particularly from the artesian waters of North Dakota, is discussed from the standpoint of the occurrence of mottled enamel. Analytical methods for the determination of small concentrations of fluorides are reviewed and criticized, and a method is defined. Zeolites will remove fluoride but the capacity is too small to be practical. The same is true of zeolites treated with manganese, nickel, zirconium, cobalt and chromium. In low pH conditions, activated charcoal will remove fluoride. Other useful methods of removal are delineated and the difficulties described. The most successful, though, was a lead filter which in itself is toxic. (Bradbeer-NWWA) W75-06815

SOLID BOWL CENTRIFUGAL SEPARATOR. For primary bibliographic entry see Field 5D. W75-06835

5G. Water Quality Control

STOCHASTIC VARIATIONS IN WATER QUALITY PARAMETERS,
Rutgers - the State Univ., New Brunswick, N. J. Bureau of Engineering Research.
For primary bibliographic entry see Field 5B. W75-06355

AN INVENTORY AND SENSITIVITY ANALYSIS OF DATA REQUIREMENTS FOR AN OX-YGEN MANAGEMENT MODEL OF THE CAR-

SON RIVER, Nevada Univ., Reno. Dept. of Civil Engineering. For primary bibliographic entry see Field 5B. W75-06356

ESTUARINE POLLUTION IN THE STATE OF HAWAII, VOLUME 2: KANEOHE BAY STUDY, Hawaii Univ., Honolulu. Water Resources Research Center. For primary bibliographic entry see Field 5B. W75-06362

SOIL AS A MEDIUM FOR THE RENOVATION OF ACID MINE DRAINAGE. Pennsylvania State Univ., University Park. Dept.

of Agronomy.

For primary bibliographic entry see Field 5D.

SALINITY IN WATER RESOURCES. For primary bibliographic entry see Field 3C. W75-06366

A WATER QUALITY MODEL TO EVALUATE WATER MANAGEMENT PRACTICES IN AN IRRIGATED STREAM-AQUIFER SYSTEM. Geological Survey, Denver, Colo. L. F. Konikow, and J. D. Bredehoeft.

In: Proceedings of the 15th Annual Western Resources Conference, July, 1973, University of Colorado, Boulder, Merriman Publishing Co., Boulder, 1974, p 36-59, 14 fig, 2 tab, 10 ref.

Descriptors: *Model studies, *Mathematical models, *Salinity, *Watershed management, *Colorado, Saline water, Return flow, Irrigation efficiency, Crop response, Irrigation practices, Groundwater, Economics, Forecasting, Projections of the control *Model studies, *Mathematical linity, *Watershed management, ons, Irrigation. Identifiers: Arkansas River.

The complex water-quality variations which exist in an irrigated stream-aquifer system can be simulated with a digital model that couples a finite-difference technique, used to solve the flow equations, with the method of characteristics used to solve the transport (dispersion) equations. This modeling technique was successfully applied to an 11-mile stretch of the Arkansas River southeastern Colorado for a one year period. Once verified, the model can be used to predict the effects of changes in management or irrigation practices on the quality and quantity of ground and surface water. Three tests were run to demonstrate the types of problems to which the model might be applied. Analysis of the tests indicated that initial or short-term responses to changes in irrigation practices are strongly related to antecedent conditions and do not necessarily reflect actual longterm responses to these changes. Perhaps the greatest value of the model is its capability to be utilized for predicting future long-term results. The model can be applied to other irrigated areas where the required data are available or can be collected. Although the cost of initiating and maintaining a satisfactory data collection network may be considered high, it is believed that these can be justified in many areas by the potential benefits that can be derived from a calibrated model. With a few programming modifications, the technique can be used for many problems in which it is desired to predict the rates and directions of move-ment of contaminants through a saturated porous medium. (See also W75-06366) (Bowden-Arizona) W75-06369

ECONOMIC ANALYSIS OF OPTIMAL USE OF SALINE WATER IN IRRIGATION AND THE EVALUATION OF WATER QUALITY, Hebrew Univ., Jerusalem (Israel). Dept. of Agricultural Economics.

For primary bibliographic entry see Field 3C. W75-06370

EVALUATING AGRICULTURAL EFFECTS OF SALINITY ABATEMENT PROJECTS IN THE COLORADO RIVER BASIN: AGRONOMIC AND ECONOMIC CONSIDERATIONS, Colorado State Univ., Fort Collins. Dept. of

R. A. Young, W. T. Franklin, and K. C. Nobe.
In: Proceedings of the 15th Annual Western
Resources Conference, July 1973, University of
Colorado, Boulder, Merriman Publishing Co.,
Boulder, 1974. p 86-107, 29 ref.

Descriptors: *Colorado River Basin, *Salinity, Water pollution sources, *Cost-benefit analysis, *Economic justification, Saline water, Saline soils, Arizona, Colorado, Utah, Wyoming, California, Nevada, New Mexico, Pollution abatement, Water pollution, Soil profiles, Salt tolerance, Crop response.

Agronomic, economic and other considerations for evaluating effects of salinity on irrigated cropping regions are reviewed. Salinity abatement benefits in crop yield are compared with salinity costs. However, estimates of yields from saline waters are difficult because the data base, derived from studies at the U.S. Salinity Laboratory, Princetok Colifornia of manufaceable which from studies at the U.S. Salinity Laboratory, Riverside, California, is of questionable validity. Present methods of predicting the average soil profile salinity are subject to gross errors. Also, farm methods can drastically effect salinity damage, and thus make estimates difficult. It is questionable if secondary and indirect economic impacts from salinity in the Colorado River Basin presenting the salinity of the Colorado River Basin. are pertinent since such effects are likely to be offset elsewhere in the national economy. In view of these facts, and because of the large public invest-ment (up to \$500 million) salinity abatement projects would require in the basin, a new reassess-ment of salinity damages is called for. (See also W75-06366) (Bowden-Arizona)

ECONOMIC INCENTIVES FOR SALINITY REDUCTION AND WATER CONSERVATION IN THE COLORADO RIVER BASIN, Colorado Univ., Boulder. Dept. of Economics. For primary bibliographic entry see Field 3C. W75-06373

Field 5-WATER QUALITY MANAGEMENT AND PROTECTION

Group 5G-Water Quality Control

COST SHARING AND EFFICIENCY IN SALINI-

TY CONTROL, National Bureau of Standards, Washington, D.C. Building Economics Section.
For primary bibliographic entry see Field 3C.

FINDING KNOWLEDGE GAPS: THE KEY TO SALINITY CONTROL SOLUTIONS, Colorado State Univ., Fort Collins. Environmental

Resources Center.

In: Proceedings of the 15th Annual Western Resources Conference, July 1973, University of Colorado, Boulder, Merriman Publishing Co., 1974. p 153-159, 4 ref.

Descriptors: *Regional analysis, *Colorado River Basin, *Saline soils, *Saline water, *Salinity, *Research priorities, Colorado, Arizona, Wyom-ing, New Mexico, Utah, Nevada, California, Water pollution, Desalination, Water pollution sources, Irrigation water, Research faciliti

Science has not totally solved the salinity problem and irrigators are not using what improved techniques now exist. Also, the nature of the salinity problem has changed from one of simply ining the proper field environment for plant growth to the new complication of not discharging highly saline waters for use by downstream farmers. Three possible alternative solutions present themselves. One can control irrigation return flow, control point sources of salt, and control natural sources of salt. The water resources research centers of the Colorado River Basin are now moving to attack the problem together. This will help identify research which must be done, and will in-tegrate this research. (See also W75-06366) (Bowden-Arizona) W75-06375

HYDROGEOLOGY AND WATER QUALITY

MANAGEMENT, Moody and Associates, Inc., Harrisburg, Pa. Enental Services Div.

R. A. Landon.

Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 101, No HY2, Proceedings paper 11137, p 285-289, February

Descriptors: *Management, *Hydrogeology, Descriptors: "Management, "Hydrogeology, "Water quality, Aquifer management, Environ-mental effects, Land use, Topography, Soils, Geology, Geochemistry, Surface-groundwater relationships, Groundwater movement, Discharge(Water), Model studies, Methodology, Geologic mapping, Maps, "Pennsylvania, Hydrau-

Identifiers: Static systems, Dynamic systems,

Numerous environmental and water quality investigations were completed which are largely two-dimensional in that the environmental and land-use factors were evaluated from a surficial standpoint only, with minimum concern given to the third dimension of depth, and therefore, the majority of the hydrogeologic framework lying below land surface. An integral part of Comprehensive Water Quality Management Planning (COWAMP) program for Pennsylvania is a definition of the hydrogeologic framework that controls the occurrence of ground water, as well as data describing the quantity and quality of that resource. Recognition of the fact that the environment is a complex interweaving of many variables, and the strong control exerted by the natural physical components comprising the hydrogeolog-ic framework can be expected to minimize or avoid the deleterious and sometimes catastrophic results of the omission of such recognition. (Visocky-ISWS) W75-06400

POLICY AND RESEARCH IMPLICATIONS OF THE NATIONAL WATER COMMISSION'S RECOMMENDATIONS,

Wisconsin Univ., Madison. Dept. of Agricultural

For primary bibliographic entry see Field 6E. W75-06404

A COMPILATION OF AUSTRALIAN WATER QUALITY CRITERIA, Caulfield Inst. of Tech., (Australia).

B. T. Hart. Australian Water Resources Council, Technical Paper No. 7, 1974. 349 p. Published by Australian Government Publishing Service, Camberra.

Descriptors: Water quality, *Water quality control, *Water quality standards, Water resources, roi, "Water quality standards, Water resources,
"Planning, "Governments, Legislation,
"Management, Social aspects, Evaluation, Documentation, Public health, Aquatic life,
Ecosystems, Domestic water, Crop production,
Irrigation, Livestock, Industrial water, Aesthetics,
Recreation, Bioassay.
Identifiers: "Australia.

The environmental assessment process can be considered to have two dimensions: (1) planning to ensure environmental compatability; this will be achieved by the development of an environmental assessment methodology designed as far as possible to fulfill three requirements, namely, (a) identify potential beneficial and adverse impacts arising from a range of alternative actions; (b) measure trom a range or atternative actions; (b) measure the magnitude of all impacts; (c) evaluate the im-portance of all impacts; (2) the formal documenta-tion of expected environmental impacts. This planning process generally involves the input of in-formation supplied from surveys to provide baseline data, from citizen participation, and from documented environmental criteria. The problem is most obvious in the field of water quality control. The efficient management of Australia's water resources depends, among other things, upon adequate baseline data and a comprehensive collection of water quality criteria for all beneficial uses of water. (Houser-ORNL)

SURFACE WATER QUALITY IN MINNESOTA: THE TRANSLATION OF GOALS AND POLICIES INTO RESULTS, Minnesota Univ., St. Paul. Water Resources Research Center.

Available from the National Technical Informa-tion Service, Springfield, Va 22161 as PB-241 016, \$4.75 in paper copy, \$2.25 in microfiche. Bulletin No. 72, February 1975, 70 p. OWRT B-054-Minn(8). 14-31-0001-3601.

Descriptors: *Water quality, *Water pollution, *Water resources, Administration, *Minnesota, Planning, Economics, Water policy, Alternative planning, Legislation, Legal aspects, State government

Identifiers: Zero discharge.

The study focuses on problems of translating public policy goals relating to surface water quali-ty into reality. Surface water pollution is seen as a result of economic incentives. Broad policy alternatives for addressing surface water pollution are examined. Judicial measures for dealing with water pollution problems are discussed, along with their limitations and the necessity for specific legislation. Water quality legislation at the Federal and State (Minnesota) level is reviewed. The mechanics of water quality administration are discussed, with emphasis on the Minnesota Pollution Control Agency. Problems and progress under the Water Pollution Control Act Amendments of 1972 are discussed. Changes in enforcement tools are emphasized. Other problems relating to surface water pollution control are discussed including the funding gap and the zero-discharge con-

ECOLOGICAL AND PHYSIOLOGICAL IMPLICATIONS OF GREENBELT IRRIGATION, PROGRESS REPORT OF THE MALONEY CANYON PROJECT-1974, California Univ., Riverside. Dept. of Plant

For primary bibliographic entry see Field 5D. W75-06461

ENVIRONMENTAL STUDIES (1973), JAMES BAY TERRITORY AND SURROUNDING AREA, Department of the Environment, Hull (Quebec); and James Bay Development Corp., Montreal For primary bibliographic entry see Field 6G. W75-06467

GREAT LAKES WATER QUALITY, ANNUAL REPORT TO THE INTERNATIONAL JOINT COMMISSION, (1973).
International Joint Commission-United States and

Canada. Great Lakes Water Quality Boar For primary bibliographic entry see Field 5B. W75-06474

DEVELOPMENT OF CRITERIA TO CONTROL OCEAN DUMPING - EXECUTIVE SUMMARY Interstate Electronics Corp., Anaheim, Calif. Oceanics Div. For primary bibliographic entry see Field 5E.

WATER QUALITY STANDARDS AND INTER-NATIONAL DEVELOPMENT.

Agency for International Development, Washington, D.C. Office of Science and Technological Available from the National Technical Information Service, Springfield, Va 22161 as PB-204 408, \$3.75 in paper copy, \$2.25 in microfiche TA/OST/71-4, October 1971. 27 p, 15 ref, append.

Descriptors: *Water quality standards, *Water quality control, Water supply, United States, Surface waters, Water resources, Public health, Economics, Water quality, Water pollution con-

Identifiers: Developing countries.

W75-06486

The development of water quality criteria and standards in the United States was traced and water supply problems and water standards in the developing countries of the world were assessed. The World Health Organization was credited as the major force in introducing drinking water standards in developing countries and in promoting techniques to increase the availability of safe community water supplies. Unease was expressed over the delicate and difficult balance of simultaneously achieving pollution abatement and economic development. Inadequate policies, laws, and institutions were cited as responsible, in large part, for limited progress in improving community water supplies and in economic development. Specific steps for overcoming such deficiencies were given. A summary of selected criteria from 'International Standards for Drinking Water' (WHO, second edition, 1963) was appended. (Harmeson-ISWS) W75-06487

THE WESTERNPORT BAY ENVIRONMENTAL

Victoria Ministry for Conservation, Melbourne (Australia). Westernport Bay Environmental Study. For primary bibliographic entry see Field 6G.

W75-06555

THE UNCERTAIN SEARCH FOR ENVIRON-MENTAL QUALITY,

Yale Univ., New Haven, Conn. School of Law. B. A. Ackerman, S. Rose-Ackerman, J. W.

Sawyer, Jr., and D. W. Henderson. The Free Press, A Division of Macmillan Publishing Co, Inc, New York, NY, 1974. 386 p, 12 fig, 10 tab, 219 ref, 5 append.

Descriptors: *Water pollution control, *Water policy, United States, *Economics, *Political aspects, *Legal aspects, *Regulation, *Delaware River Basin Commission, Costs, Benefits, Mar-ginial costs, Cost-benefit analysis, Dissolved ox-ygen, Biochemical oxygen demand, Zoning, Mathematical models, Systems analysis.

ygen, Biocaemical oxygen demand, Zoning, Mathematical models, Systems analysis. Identifiers: *Environmental quality, *Delaware Estuary Comprehensive Study, Cost minimization, Regulation models, Technocratic approach, Market model, Activist approach, Legal orders.

The scientific, economic, political and legal foundations of the water pollution policy currently being pursued in the United States are analyzed in depth. Extensive study is made of the Delaware River Basin Commission's program to clean-up thly polluted Delaware Estuary flowing past elphia. Through the Delaware example, the Philadelp failings of the present national program are exem-plified; shown is how policymakers have been led to fight the wrong war against environmental degredation--a multi-billion dollar war generating pitifully meager results. Advanced technocratic methods and creative institutional engineering have proved inadequate for environmental tasks. Analyzed are the use of cost-benefit analysis as an environmental policy tool and the Delaware Estua-ry Comprehensive Study (DECS) approach to nefit estimation. Three models of regulation are available for an agency considering a cost-minimization strategy: legal orders, market model, and activist approach. A new set of policy objectives and institutional mechanisms is pr Three levels of recommendations include: (1) subive environmental policy, calling for a more self-conscious effort to set priorities; (2) institu-tional reconstruction, which advocates central control for coherent development while not giving a single agency unlimited power to define and resolve a given pollution problem; and (3) policy implementation, wherein the limitations of innovation within the traditional model of regulation through legal orders are explored, and a dis-criminating incorporation of market and activist models of control are proposed. (Bell-Cornell) W75-06557

COMPREHENSIVE WATER QUALITY MANAGEMENT PLANNING,

Pennsylvania Dept. of Environmental Resources Harrisburg. Office of Comprehensive Water and Wastewater Management Planning.
K. A. Bartal, and L. V. Gutierrez, Jr.

Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 101, No HY4, Proceedings paper No 11263, p 371-386, April 1975. 3 fig, 2 tab.

Descriptors: *Water quality, *Water management(Applied), *Comprehensive planning, *Regions, *Social participation, *Pennsylvania, Hydraulics, Water resources, Computer models, Alternative planning, Economics, Design, Operation and maintenance, Groundwater, Simulation analysis, Mathematical models.

tion and maintain analysis, Mathematical models.

Identifiers: *Data systems, Environmental factors, Environmental planning, Federal legislation, Statewide, Management criteria, Nonpoint source

The comprehensive water quality management planning (COWAMP) program being undertaken by the Commonwealth of Pennsylvania responds to the latest Federal legislation and regulations, as well as to state requirements. The study program has been divided into nine separate local studies and represents a statewide effort to establish a valid water quality management plan that responds to alternative environmental futures and features a precedent-setting degree of public participation. The Pennsylvania COWAMP program is not typical; it is a multidisciplinary attack on the complex problem of creating realistic yet aggressive water quality management criteria, based not only on the nological but also on the social, economic, and land-use aspects of environmental planning. By articulating and incorporating environmental amenities unique to Pennsylvania, the program will be tailored specifically to the Commonwealth's needs. To provide consistency among the statewide water quality management studies, the consultants will use two computer modeling tools ECOFIN accomplishes the preliminary design of system components to obtain total present-worth costs of construction, replacement, operation, and costs of construction, replacement, operation, and maintenance over specific planning periods. UDOM is intended to provide a comprehensive water quality simulation model based on the modified Streeter-Phelps equations for DO and BOD. (Bell-Cornell) W75-06558

ANALYSIS OF MULTIPLE OBJECTIVES IN WATER QUALITY, Case Western Reserve Univ., Cleveland, Ohio.

eering Div. For primary W75-06559 bibliographic entry see Field 5D.

OF LAKE RESTORATION

PROCEDURES,
Colorado Univ., Boulder.
C. J. Boyter, and M. P. Wanielista.
Water Resources Bulletin, Vol 9, No 3, p 499-511, June 1973, 1 tab. 33 ref.

Descriptors: *Lakes, *Water quality control, Bottom sediments, Aquatic plants, Oxygen, Manage-ment, Sewage, Nurtients, Water pollution, Florida, Water treatment, Oxygenation, Dredging, Drawdown, Costs, Destratification.
Identifiers: *Resotration procedures(Lakes), Displacement, Water hyacinths, Literature review.

Results are reported of a search to find what restoration procedure to use for a given lake condition. The restoration procedures considered are applicable to water, bottom sediments, and aquatic plant impovement. Thirteen suggested aquatic paint impovement. Thirteen suggested methods of restoration are reviewed. The techniques which apply to water include: (1) the elimination of pollutants entering the water from controllable sources; (2) replacing the water with high cubility partners. high quality water; and (3) direct treatment of the ng water. Methods to control pollution existing water. Sections to control pollutions releases from the bottom sediments have been divided into three categories: sediment covering, oxygenation, and dredging. Techniques for removal or control of undesirable plants or plant productivity with the goal of restoring the natural balance ategorized as chemical, mechanical, biological, and physical. Discussion of these procedures d methods should provide pollution control and water management agencies with some additional information for making the choice of the appropriate restoration technique. (Bell-Cornell) W75-05566

WATER QUALITY MANAGEMENT: THE CASE FOR RIVER BASIN AUTHORITIES, Ohio Univ., Athens. Dept. of Civil Engineering.

J. L. Thomas. ter Resources Bulletin, Vol 9, No 5, p 884-891, October 1973, 17 ref.

Descriptors: "Water management(Applied),
"Water pollution control, "River basin commissions, "Planning, Waste water treatment, Regions,
Comprehensive planning, Economics, Operations,
Water policy, Federal government, State governments

Identifiers: *Environmental quality.

There is a lamentable absence of comprehensive planning in the current crusade to improve water A serious shortcoming is the lack of evaluation of the effects of waste water treatment upon environmental quality. State efforts to cure adequate pollution control have been ineffective for several reasons, including lack of money, trained personnel, and political strength. On the federal level, current interpretation of offi-On the federal level, current interpretation of offi-cial policy encourages only a superficial plan in order to qualify for federal money. The nature of pollution in a river basin demands a coordinated attack against it. Engineering and economic criteria suggest that a properly empowered river basin authority would be the logical organization to plan and operate a water quality management system. Several forms of such authorities have operated effectively and efficiently for many years in the United States and other industrialized countries. Examples of successful river basin authorities and their advantages and methods of operation are discussed. By utilizing the economies of scale available through comprehensive planning and coordinated operation over a large region, the river basin authority should give the taxpayer more for his money; moreover, the authority should be more flexible and stable. (Bell-Cornell) W75-06571

NUMERICAL MODELING OF THERMAL STRATIFICATION IN A RESERVOIR WITH LARGE DISCHARGE-TO-VOLUME RATIO, Tennessee Valley Authority, Muscle Shoals, Ala. Air Quality Branch.

For primary W75-06572 bibliographic entry see Field 2H.

MISSISSIPPI COASTAL ZONE MANAGEMENT APPLICATION 1974.
Mississippi Marine Resources Council, Long

For primary bibliographic entry see Field 6E. W75-06575

WATER REGULATIONS-TOXIC POLLUTANT

EFFLUENT STANDARDS.
Pollution Control Guide, Vol 2, paragraph 8950, p 9385-9388, 1973.

Descriptors: "Water quality standards, "Federal government, "Toxins, "Water pollution control, "Pollutant identification, Water law, Administrative agencies, Water pollution, Water quality, Water quality control, Legislation, Legal aspects, Pollutants, Federal Water Pollution Control Act, Pollutants, Pederal Water Pollution Control Act, Pollutants, Pederal Water Pollution Control Act, Pollutants, Pederal Water Pollution Control Act, Pederal Water Pollution Control Con Water Quality Act, Regulation, Poisons, Water pollution effects, Water pollution sources, Public

Identifiers: Hazardous substances(Pollution), Effluent limitations, FWPCA Amendments of 1972, Administrative regulations, Mercury pollution, Environmental policy.

The criteria to be used by the Environmental Pro-tection Agency (EPA) in the selection of toxic pol-lutants for which specific effluent standards will be established are presented. These criteria were established by the EPA pursuant to section 307(a) of the Federal Water Pollution Control Act Amendments of 1972. Specific provisions require the application of the following basic criteria: (1) Available data indicate that the pollutant could, if discharged into water, constitute a serious en-vironmental threat; (2) the pollutant is discharged, or can be discharged, from point sources; (3) data are available to establish effluent standards meetthe requirements of the Act; and (4) abatement ing the requirements of the Act; and (4) abatement actions under other provisions of the Act are not commensurate with the nature and seriousness of the pollution problem. The following pollutants are included as toxic pollutants and others may be added in the future: aldrin; dieldrin; benzidine; cadmium; cyanide; DDD; DDE; DDT; endrin; mercury; polychlorinated biphenyls; toxaphene. (Deckert-Florida)

Field 5-WATER QUALITY MANAGEMENT AND PROTECTION

Group 5G-Water Quality Control

W75-06576

REGULATIONS--PRETREATMENT WATER STANDARDS.

Pollution Control Guide, Vol 2, paragraph 8941-8945, p 9381-9382, 1973.

Descriptors: *Water quality standards, *Industrial water, *Federal government, *Regulation, water, *Federal government, *Regulation, *Administrative agencies, Water law, Waste water(Pollution), Water pollution, Water pollution control, Water pollution treatment, Water quality control, Legislation, Water quality, Federal Water Pollution Control Act, Pollutants, Legal aspects, Regulation.

Identifiers: Effluent limitations, Administrative regulations, FWPCA Amendments of 1972, Environmental policy.

Regulations were established by the Environmental Protection Agency implementing section 307(b) of the Federal Water Pollution Control Act Amendments of 1972. These regulations set forth standards for pretreatment of pollutants introduced into publicly owned treatment works. The standards apply to all non-domestic users of public treatment works, with special provision applicable to major contributing industries as defined in this part. These regulations do not affect any state or local pretreatment standards not in conflict with federal standards. Specific provisions flict with federal standards. Specific provisions imit the quantity and quality of incompatible pollutants which may be introduced into publicly owned treatment works, with further provision calling for compliance with specific effluent limitation guidelines for specific industry categories as such guidelines are promulgated. Compliance must be attained not later than three years from the date of final promulgation of such standards. (Deckert-Florida) W75-06579

ENVIRONMENTAL DEFENSE FUND V. TEN-NESSEE VALLEY AUTHORITY.

For primary bibliographic entry see Field 6E. W75-06580

STATE OF WISCONSIN V. CALLAWAY (ACTION FOR INJUNCTIVE RELIEF ON DREDGING ACTIVITIES ON MISSISSIPPI RIVER).

For primary bibliographic entry see Field 6E. W75-06581

STATE EX REL. DEPARTMENT OF HEALTH V. NORTH JERSEY DISTRICT WATER SUPPLY COMMISSION (ACTION SEEKING MANDATORY INJUNCTION ON REQUIRING COMPLIANCE WITH ORDER TO IMPROVE, ADD TO, OR ALTER WATER TREATMENT

For primary bibliographic entry see Field 6E. W75-06582

STATE LAND USE PLANNING. For primary bibliographic entry see Field 6E. W75-06583

ENVIRONMENTAL LAW-PUBLIC TRUST-IN-JURY TO PUBLIC TRUST IS BASIS FOR AWARD OF DAMAGES, W. L. Christian.

Seton Hall Law Review, Vol 5, p 394-408, Winter 1974, 121 ref.

Descriptors: *Judicial decisions, *New Jersey, *Nuclear powerplants, *Thermal pollution, Bays, Rivers, Intertidal areas, Waste water disposal, Legal aspects, Level review, Aquatic life, Damages, Wildlife conservation, Common law, Land tenure Identifiers: *Public trust doctrine.

plant which used water from the Forked River for cooling and discharged the heated water into Oyster Creek and Barnegat Bay, both tideland areas. An unscheduled shutdown of the plant resulted in a ten degree temperature drop in Oyster Creek. This led to the death of approximately five hundred thousand fish, mostly menhaden, from thermal shock. The State sued on several counts, one of which was a common law action for one of which was a common was action for recovery of damages by the State as parens patriae for injury to wildlife. The court held the State had the right and the fiduciary duty to collect damages for the destruction of wildlife, a part of the corpus of the public trust. (Sperling-Florida)

In State v. Jersey Central Power and Light Co., the

defendant company operated an atomic power

ENVIRONMENTAL LAW-JUDICIAL REVIEW UNDER NEPA, J. Holtmann.

Missouri Law Review, Vol 38, p 658-664, Fall

Descriptors: *Federal jurisdiction, *Arkansas, *Legal aspects, *Decision making, Construction, s, Adoption of practices, Administration, Legal review, Environmental effects, Planning, Recreation, Water supply, Natural flow, Water al-location(Policy), Water requirements, Flood pro-

Identifiers: National Environmental Policy Act, Environmental Impact Statement.

In Environmental Defense Fund v. Corps of Engineers, the plaintiff sought to halt construction of a dam. The district court entered a temporary injunction which was to be vacated when the C of Engineers complied with the provisions of the National Environmental Policy Act by preparing an environmental impact statement. It required that the statement detail the environ It was tal consequences of the project and the possible alternatives to the proposed course of action. The court found that construction of the dam would deprive the area of a free flowing stream. In addition, the court noted that although other dams already provided an abundance of recreational waters, the proposed dam would provide needed flood control and water supply benefits. The balancing of interests was irrelevant, however, since there could be no judicial review of the merits of an agency decision to continue construc-tion of the dam. The decision was affirmed on appeal with a modification allowing for limited review of the merits of agency decisions. (Sperling-Florida) W75-06585

MAN'S ACTIVITIES IN WATERSHED AREAS-A NEED FOR PLANNING, For primary bibliographic entry see Field 4D. W75-06588

FEDERAL WATER POLLUTION CONTROL STATUTES IN THEORY AND PRACTICE. s Univ., Chicago. I., M. Wenner

Environmental Law, Vol 4, p 251-293, Winter 1974, 154 ref.

Descriptors: *Federal government, *Water pollution control, *Water quality, *Administration, *Legal aspects, *Federal Water Pollution Control Act, Abatement, Judicial decisions, Legislation, Legal review, Law enforcement, State governments, Water resources, Waste water treatment, Waste assimilative capacity, Waste dilution,

Navigable waters, Conservation.
Identifiers: Federal Water Pollution Control
Amendments of 1972, Standing(Legal aspects),
Refuse Act of 1899, National Environmental Pol-

Until fairly recently, federal legislative efforts toward the abatement of water pollution have been designed to influence, indirectly, the vigor with which states enforced their own laws. Since 1965 there has been a shift toward greater direct federal involvement in enforcement. In the face of initial opposition by the states, the change in emphasis has been accomplished gradually. In the 1972 Amendments of the Federal Water Pollution Control Act the attempt to shift the main responsibility of dealing with water pollution to the federal agen-cies fell short. The 1972 Amendments project as an ultimate goal for 1985 'a no discharge policy', or complete treatment of wastes before discharge into waterways. While final approval of state discharge permit plans vests in the Environmental Pollution Agency, initial enforcement of effluent standards is to be left in the states where that power has long resided. While the new law resolves some old problems such as the concept of navigable waters, standing to sue, and group actions, other questions, such as the attitudes of administrators of the new law and the appropriate role of the federal government in water pollution control remain. (Sperling-Florida)

HANDLING OF AIR AND WATER POLLUTION CASES BY THE PLAINTIFF, R. E. Cartwright.

Forum, Vol 9, p 639-648, Spring 1974. 5 ref.

Descriptors: *Legal aspects, *Judicial decisions, *Water pollution, *Water quality control, *Common law, Institutional constraints, Law en forcement, Legal review, Negligence, Water law, Trespass, Natural flow doctrine, Relative rights, Water rights, Preferences(Water rights). Prescriptive

Historically, the courts and the economy in both the products liability and environmental law fields have been more concerned with helping industry grow than they have been with the protection of individuals who might be injured in the process. Industrial progress, employment, and the promise of extra tax revenues have always seemed to outweigh the protection of individuals and the imposition of great social costs. In the face of this inertia various legal theories have evolved to assist plaintiffs. The negligence theory adequate particularly where the plaintiff has sustained actual property or personal injury damages. The trespass theory is applicable where the defendant has caused an entry onto the plain-tiff's property, even if the intrusion was caused by a gas. The nuisance theory is most widely used in environmental actions, and the theory of strict liability for ultra-hazardous activities has been succesfully used in cases dealing with drifting crop sprays and the escape of lethal exterminating gases. In addition, federal, state and local enact-ments in the pollution field have come to the aid of plaintiffs. (Sperling-Florida) W75-06593

NEW WATER LAW PROBLEMS AND OLD PUBLIC LAW PRINCIPLES, New Mexico Univ., Albuquerque. For primary bibliographic entry see Field 6E. W75-06595

RED TIDE RESEARCH. For primary bibliographic entry see Field 6E. W75-06596

BISCAYNE BAY-AQUATIC PRESERVE. For primary bibliographic entry see Field 6E. W75-06:98

WATER REGULATIONS-AREAWIDE WASTE TREATMENT MANAGEMENT PLANNING

WATER QUALITY MANAGEMENT AND PROTECTION—Field 5

Water Quality Control—Group 5G

AREAS AND RESPONSIBLE PLANNING AGEN-CIES.

Pollution Control Guide, Vol 2, paragraph 8938-38N, p 9375-9378, 1974.

*Water pollution treatment. development, *Comprehensive *Regional planning, *Federal government, *Administrative agencies, Urbanization, Water law, Waste water(Pollution), Water pollution, Water pollution control, Community development, Water quality control, Legislation, Water quality, Federal Water Pollution Control Act, Legal aspects, Regulation, State governments, Local governments, Governmental interrelations

Identifiers: Administrative regulations, Environmental policy, FWPCA Amendments of 1972

Regulations were established by the Environmental Protection Agency (EPA) pursuant to section 208(a) of the Federal Water Pollution Control Act Amendments (FWPCA) of 1972. These regulations are designed to serve as guides for state and local officials in identifying areas which, as a result of urban-industrial concentrations or other factors, have substantial water quality control problems which require an areawide approach to planning for the implementing of corrective action. Procedures and criteria are also set forth for designating agencies which are capable of developing waste treatment management plans for such areas. Within 180 days after issuance of this part the Governor of each state shall notify the EPA of his actions regarding designation of 208 planning areas and agencies. Only those agencies designated under this part shall be eligible for assistance under section 208(f),(l),(g) and (h) of the FWPCA Amendments of 1972. (Deckert-Florida) W75-06599

WATER REGULATIONS--OIL POLLUTION PREVENTION.

Pollution Control Guide, Vol 2, paragraph 8720-8727, p 9215-9219, 1974.

Descriptors: *Water pollution, *Oil wastes, *Navigable waters, *Water pollution sources, Wastes, Chemical wastes, Industrial wastes, Oil, Values, Chemical Wastes, Industrial Wastes, Onl.
Oil spills, Waste water(Pollution), Waste water disposal, Water pollution, Disasters, Water law, Water resources development, Water quality control, Water quality standards, Pollution abatement, Enforcement, Administration, Regulation, Environmental control.

Identifiers: State policy, Administrative regula-

Regulations establish procedures, methods, and equipment and other requirements for equipment to prevent the discharge of oil from non-transportation-related onshore and offshore facilities. The regulations generally apply to oil pollution of navigable waters of the United States or adjoining shorelines. Actual or potential polluters are required to prepare and implement spill prevention control and countermeasure plans. These plans must be prepared in accordance with good en-gineering practices to include containment equipment for possible oil discharges. Bulk storage installations and dike containment areas must be statiations and take containment areas must be sufficiently impervious to contain spilled oil. Al-ternative containment systems are required to pro-vide for emergency in-plant catch basins or hold-ing ponds. Civil penalties are set forth for non-compliance of provisions. (Proctor-Florida)

REGULATIONS--POLICIES PROCEDURES FOR STATE CONTINUING PLANNING PROCESS.

ution Control Guide, Vol 2, paragraph 8960-8986, p 9391-9397, 1974.

Descriptors: *Comprehensive planning, *Federal government, *State governments, *Administrative agencies, *Water quality control,

Discharge(Water), Future planning(Projected), Watersheds(Basins), Basins, Planning, Water resources development, Water pollution control, Administration, Coordination, Long-term planning, Governmental interrelations, Inter-agency cooperation, Water quality standards, Water law, Water quality control, Federal Water Pollu-tion Control Act, Water Quality Act, Control, Hydrologic systems.

Identifiers: Administrative regulations, Environmental policy, National Pollutant Discharge Elimination System, Effluent limitations, FWPCA Amendments of 1972.

Regulations were established by the Environmental Protection Agency pursuant to section 303(e) of the Federal Water Pollution Control Act, as amended in 1972. These regulations specify procedural and other requirements for the submission and approval of state continuing planning processes. The state continuing planning process is directed toward the attainment of water quality standards established under section 303 of the Act which are designed to achieve the goals set forth in the Act. The process provides a mechanism for developing an annual state strategy for directing resources, establishing priorities, scheduling actions, and reporting progress. Included are regulations pertaining to the scope and purpose of the processes, definitions, general requirements, specific requirements for basin plans and annual state strategies, submission and approval of planning processes and reports, and the relation-ship of the processes to state participation in the National Pollutant Discharge Elimination System. (Deckert-Florida)

ADOPTED STANDARDS (WATER QUALITY). Pollution Control Guide, Vol 1, paragraph 581-588, p 577-580, February 1974.

Descriptors: *Administrative agencies, *Water quality standards, *Federal Water Pollution Conquality standards, *Federal water rollated trol Act, *State governments, *Adoption of practical Administration. Water tices, Decision-making, Administration, Water law, Legislation, Water quality control, Water pollution control, Legal aspects, Federal government, Water quality, Water treatment, Regulation, Governmental interrelations, Water policy, Law enforcement, Jurisdiction, Federal-state rights conflicts

Identifiers: FWPCA Amendments of 1972, Administrative regulations, Environmental policy,

Any water quality standard adopted by any state awaiting approval or approved by the Environmental Protection Agency (EPA) on October 18, 1972, will remain in effect unless the state is notified of any required changes. The 18th of October is the date of enactment of the Amendments to the Federal Water Pollution Control Act. If the state failed to adopt the required changes within ninety days the agency would be required to ulgate the necessary changes. Any state that had not adopted intrastate water quality standards by October 18, 1972, was required to adopt and submit such standards to the EPA Regional Administrator by April 16, 1973. The Agency may establish water quality standards for a state the fails to adopt or revise adequate standards by calling a conference of federal departments and agencies, interstate agencies, states, municipali-ties and industries affected by the standards. Following the conference, the Agency may establish such standards pursuant to procedures set forth in the Act. (Sperling-Florida)

POWER AUTHORITY OF STATE OF NEW YORK V. DEPT. OF ENVIRONMENTAL CONSERVATION OF STATE OF NEW YORK (SEEKING DECLARATORY AND INJUNCTIVE RELIEF AS TO WHETHER DEPARTMENT WAS WITHOUT AUTHORITY IN ISSUING

CERTIFICATE FOR POWERPLANT WATER DISCHARGE).

For primary bibliographic entry see Field 6E. W75-06606

U.S. V. W.B. ENTERPRISES, INC. (SUIT TO RECOVER CIVIL PENALTY ASSESSED FOR LEAKAGE OF OIL FROM BARGE). For primary bibliographic entry see Field 6E. W75-06607

COMMONWEALTH OF PENNSYLVANIA V. BARNES AND TUCKER CO. (ACTION TO REQUIRE OWNER OF CLOSED MINE TO TREAT ACID MINE DRAINAGE DISCHARG-ING FROM MINE).

For primary bibliographic entry see Field 6E. W75-06609

ARKANSAS ENVIRONMENTAL QUALITY ACT OF 1973. For primary bibliographic entry see Field 6E.

U.S. V. LEWIS (INJUNCTION ACTION BASED ON VIOLATION OF RIVERS AND HARBORS ACT. For primary bibliographic entry see Field 6E. W75-06612

U.S. V. STOECO HOMES, INC. (APPEAL FROM INJUNCTION FOR VIOLATIONS OF RIVERS AND HARBORS ACT). For primary bibliographic entry see Field 6E. W75-06613

WATER REGULATIONS--LIABILITY LIMITS FOR SMALL ONSHORE STORAGE FACILI-

Pollution Control Guide, Vol 2, paragraph 8730-8735, p 9221-9223, 1973.

Descriptors: *Oil pollution, *Water pollution, Descriptors: "Oil poliution, "water poliution, "Valer quality control, United States, Governments, Oil spills, Oil wastes, Oil industry, Drilling, Water pollution sources, Industrial wastes, Oily water, Water law. Identifiers: "Waste discharge, "On-shore storage

Subpart A establishes size classifications and associated liability limits for small onshore oil storage facilities with a fixed capacity of 1,000 barrels or less, Liability for discharge of oil into the waters of the United States from such facilities unless removal is performed by the United States government is limited by this subpart. Unless the United States can demonstrate willful negligence or willful misconduct within the privity knowledge of the owner, liability is assessed according to the barrel capacity and the above ground or below ground location of the facility. (Proctor-Florida) W75-06614

PROVIDENCE RIVER AND HARBOR, RHODE ISLAND (FINAL ENVIRONMENTAL IMPACT STATEMENT).

Corps of Engineers, Waltham, Mass. New En-

Available from the National Technical Informa-tion Service, Springfield, Va. 22161 as EIS-RI-73-1663-F. October 17, 1973. 173p.

pollution *Water Descriptors: "Water pollution sources,
Navigation, "Channel improvement, "Dredging,
Water pollution, Waste disposal, Channels,
Rivers, "Rhode Island, Aquatic habitat, Benthic
fauna, Benthic flora, Biochemical oxygen demand, Chemical oxygen demand, Oil spills, Commercial fishing, Ships, Oceans, Environmental ef-

Field 5-WATER QUALITY MANAGEMENT AND PROTECTION

Group 5G-Water Quality Control

Identifiers: *Environmental Impact Statements. *Providence River(R.I.), Ocean dumping.

navigation improvement project to remove shoals in the Providence River in areas opposite the Fuller Rock Light, adjacent to Ponham Beacon, and an extensive area southeast of Coninicut Light will complete the Providence River project to deepen the channel from 35 to 40 feet. The dumpsite is the ocean disposal site 4.6 miles from Brenton Reef Light in water 100-108 feet deep used in the original dredging. Adverse environmental effects are those associated with dredging and ocean disposal, including increased turbidity, increased BOD and COD, and disruption of benthic communities. Particularly in the spoil area, the fishery and benthic environment has not returned to normal within a year of dumping. To minimize further damage, disposal at the original site is recommended. Two out of three of the areas to be dredged are located near sewage outfalls and the environmental quality is consequently in a stressed condition. Recent dredging during the original project also requires an assumption that no benthic organisms of value exist, even in the area least affected by pollutants. This disruption of the environment by turbidity during dredging will be minimal, and temporary. Alternatives proved unfeasible, and completion of this project assures the efficient and safe passage of deep-draft vessels, together with accompanying economic benefits to local industries and businesses using the port. (Ostapoff-Florida)

POINT SOURCES COVERED BY NPDES AND

PROCEDURES.
Pollution Control Guide, Vol 1, paragraph 1505-1523, p 1512-1527, 1973.

Descriptors: *Discharge(Water), *Permits, *Water pollution control, *Regulation, *Federal government, Waste water(Pollution), Water quality control, Federal Water Pollution Control Act, Water Quality Act, Water law, Effluents, Water pollution sources, Administrative agencies, Control, Law enforcement, Legal aspects, Administration, Inter-agency cooperation, Water pollution treat-

Identifiers: National Pollution Discharge Elimination System, Administrative regulations, Licenses, Effluent limitations, Certification, FWPCA Amendments of 1972.

Although all discharges from point sources into navigable waters are regulated by the system of ef-fluent limitations established under the Federal Water Pollution Control Act, not all dischargers must obtain NPDES permits for the discharge of pollutants. Some dischargers are required to obtain a different permit; others need not obtain any permit. Provisions are presented that detail persons required to obtain an NPDES permit and the procedures for acquiring a permit. Specific areas covered are: requirements for submission of applications, including information and state certification requirements, application fees, and deadlines; notice to other governmental agencies; public participation requirements; environmental impact statements; power of the Regional Administrator to issue a final decision; public hearing requirements; and rules governing the conduct of adjudicatory hearings concerning proposed permit ap-plications. (Deckert-Florida) W75-06617

POLLUTION-REGULATION.

For primary bibliographic entry see Field 6E. W75-06618

EFFLUENT GUIDELINES ARE ON THE WAY.

H. M. Malin, Jr. Environmental Science and Technology, Vol 6, No 9, p 786-787, September 1972.

Descriptors: *Effluents, *Wastes, *Water pollution sources, *Industrial pollution, Industrial wastes, Waste water(Pollution), Waste water disposal, Water pollution, Regulations, Water law Water resources development, Water quality control, Water quality, Pollution abatement, Administration, Administrative decisions, Environmental control, Enforcement, Regulation, Federal

Identifiers: Administrative regulations, Environmental policy, Effluent limitations.

In its efforts to control industrial water pollution, the Environmental Protection Agency (EPA) has adopted a tactiv used by its Office of Air Programs to halt air pollution from stationary sources. The EPA's Office of Water Programs has been restructured to provide a framework for developing effluent guidelines and performance standards. The EPA's previous effluent control strategy, based on water quality standards oriented to the receiving waters, proved too costly and cumbersome. Moreover, remedies for the enforcement of these water quality standards were virtually devoid of clout. Legal authority to operate the effluent guidelines program will soon be forthcoming from Congress, and the EPA is already progressing with the program's development. The guidelines will identify both the best practicable technology cur-rently available and the best available demonstrated technology. By 1976 all industrial waste sources would be required to meet the 'best prac-ticable' guidelines. Within 15 months of the passage of the law the EPA will promulgate performance standards for new sources or all old sources which undergo 'major modification'. Such sources which undergo major modification. Such sources would have to incorporate the 'best available demonstrated techology.' The EPA will also publish a toxic substances list, effluent standards for each toxic substance, and effluent pretreatment guidelines. (Proctor-Florida) W75-06619

RESULTS OF TESTING CLEAN-FLO LAKE

CLEANSER IN FLORIDA LAKES, Florida State Game and Fresh Water Fish Commission, Lake City; and Clean-Flo Labs., Inc., Hopkins, Minn For primary bibliographic entry see Field 5D. W75-06672

LANE COUNTY PRELIMINARY GENERAL PLAN-WATER QUALITY MANAGEMENT

Lane Council of Governments, Eugene, Oreg. March, 1974. 51 p, 4 fig, 39 tab, 1 append.

*Water quality *Administration. control. Descriptors: *Waste *Management, water(Pollution), "Planning, "Industrial effluents, "Water quality standards, Water resources development, Water pollution sources, Oregon long-term planning, Operations. gene(Oregon). County(Oregon).

Actions, target dates and estimated costs involved in controlling domestic and industrial sources of water pollution in the Willamette Basin portion of Lane County, Oregon are specified in this plan.
Maps are included to show the planning area, river
basin relationships and population distribution. A
table specifies the wastewater pollution sources studied. The water quality management plan is or-ganized by river basins. It shows present and fugamized by five basis. It shows present and at-ture treatment technology for each significant domestic and industrial wastewater source. Public costs (in terms of 1972 dollars) and timing are shown for each public domestic wastewater project, and timing for funding and construction are indicated for industrial ventures. The plan itself, in complete detail, is contained in the tables and maps presented in the latter portion of this docu-ment. The appendix to the plan contains goals, pol-cies, and recommendations extracted from the 'County-Wide Policies' document that may have

an impact on water quality. Recommendations are made for the adoption of the water quality management plan as the basis for water pollution control in Lane County. (Poertner)

PROCESS FOR CONTAINING OIL SPILLS, Secretary of Agriculture, Washington, D.C.

W. L. Stanley, and A. G. Pittman.
U.S. Patent No 3,869,385, 6 p, 10 ref;; Official Gazette of the United States Patent Office, Vol 932, No 1, p 229, March 4, 1975.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, Water quality control, Water pollution control, Coagulation, *Separation Identifiers: *Chemical treatment, Polyisocyanate,

A process is described for containing an oil spill on a body of water. A polyisocyanate and a polyamine are applied to the oil spill in such amounts as to furnish free isocyanate groups in apamounts as to furnish free isocyanate groups in approximately equimolar proportion to amino groups. Both the polyisocyanate and the polyamine have a density less than that of the water and are at least partially miscible with oil but essentially immiscible with water. The process is not based on absorbance but on the principle of containing the oil by a thickening or coagulating effect, with the result that relatively small proportions of the tragents are effective. For example, in tions of the reagents are effective. For examp many cases the use of about 1 to 3 parts of polyiso-cyanate plus polyamine per 100 parts of oil is suffi-cient to attain the desired containment effect. (Sinha-OEIS)

MODULAR OIL CONTAINMENT BOOM, Murphy-Pacific Marine Salvage Co., New York.

Merritt Div. (assignee) R. K. Thurman U.S. Patent No. 3,868,824, 5 p, 3 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 932, No 1, p 49, March 4, 1975.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, Water pollution control, Water quality control, Equipment, *Separation Identifiers: Wave action, *Oil containment booms.

A floating oil containment boom is formed of a A floating of modules which may easily be con-nected and disconnected while affoat. The modules include a vertical barrier, on both sides of modules include a vertical barrier, on both sides of which are connected a pair of foam-filled drums. A flexible waterproof panel having a zipper on each end is secured to the barrier by use of battens fastened to the barrier over the panel and outside a welt formed on the panel edges where the panel overlaps the barrier. A piping is formed adjacent and parallel to the zipper on the end of the panel for use in connection with a slotted tube as an auxiliary means for fastening edicard panel and for use in connection with a stotted tube as an auxiliary means for fastening adjacent panel ends together. A set of chains is provided for interconnecting the top and bottom end corners of adjacent barriers together to prevent excessive vertical and angular displacement between adjacent modules to prevent stressing of the flexible panel by heavy wave action. (Sinha-OEIS)

OIL-WATER SEPARATION PROCESS, H. F. Keller, Jr.

U.S. Patent No. 3,867,285, 8 p, 9 tab, 2 ref; Official Gazette of the United States Patent Office, Vol 931, No 3, p 1315, February 18, 1975.

Descriptors: *Patents, *Oil wastes, *Oil pollution, *Pollution abatement, Water pollution control, *Filtration, *Separation techniques, Filters, Organic matter, Solid wastes.
Identifiers: Particulate solids, Acidification.

WATER QUALITY MANAGEMENT AND PROTECTION—Field 5 Water Quality Control—Group 5G

A filtration method for treating fluid systems containing oil, water and particulate solids to produce clarified water, solids-free oil and oil-free solids is disclosed. It uses an improved filter media which permits more rapid and efficient filtration treat-ment of such fluid systems. The fluid system containing oil having an API Gravity value from about 11 to about 70, water and particulate solids is fil-tered through a finely divided oil and water insoluble filter media to retain particulate solids and oil within the filter media and pass an effluent of either clarified water or a mixture of solids-free oil and water which separates into defined layers of solids-free oil and clarified water, with the mixture being attained when the oil content of the fluid system is in excess of about 1% by weight. When the fluid system contains acid insolubilizing, water soluble, organic material, the fluid system, prior to filtration, is acidified with a non-toxic acid to a pH below about 4.8 to convert the organic material to a water insoluble, adsorbable oil. The filter media is periodically regenerated by stripping oil therefrom and then backwashing the media to remove entrained solids. The products produced by the method include clarified water, solids-free oil and oil-free solids. (Sinha-OEIS) W75-06692

METHOD AND APPARATUS FOR PREVENT-ING THERMAL POLLUTION, Computer Sciences Corp., Los Angeles, Calif.

(assignee) For primary bibliographic entry see Field 5D. W75-06694

FLOTATION TYPE WATER SWEEP BOOM AND METHODS, C. H. Rudd.

U.S. Patent No. 3,852,965, 6 p, 11 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 929, No 2, p 530, December 10, 1974.

Descriptors: *Separation techniques, *Patents, *Oil spills, *Oil pollution, *Flotsam, Water quality control, *Pollution abatement, *Water pollution control, Equipment.

A floating boom apparatus is adapted to collect floating material and elements, such as oil, in water by being towed laterally through the water from each end of the boom. A curtain extends downward in the water from a floating surface barrier with the upper portion of the curtain being im-pervious and the lower portion being open for the passage of water. The boom is towed by two lines, one extending through the floating surface barrier and the other connected along the lower extremity of the curtain, and the lower line is pulled in advance of the upper line. (Sinha-OEIS)

REMOVAL OF MARINE GROWTHS FROM LAKES, WATERWAYS, AND OTHER BODIES OF WATER,

OF WALER, D. A. Meyer. U.S. Patent No. 3,866,396, 9 p, 22 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 931, No 3, p 1034, February 18, 1975.

Descriptors: *Aquatic weed control, *Harvesting of algae, *Patents, Lakes, Rivers, *Water quality, *Quality control, Water resources, Bodies of water, Eutrophication, Water supply, River flow, Aquatic plants, Marine plants, Submerged plants.

A novel device for selectively removing various types of marine growths from lakes, rivers, canals and other waterways has a rotary cutter placed in a housing which is closed except at its forwardmost portion. The cutter includes a rotatable drum havng helical cutter blades arranged to cut encountered growths into short lengths. A portion of ad-jacent cutter blades extend into the housing while the remaining portion of these blades are passing past the opening in the housing. The housing is submerged below the water surface from a suitable floating structure such as a barge, with a suction pump mounted on the barge connected to the housing for bringing about a suction condition. The suction extends to the space between adjacent blades passing past the opening in the housing causing encountered growths to move and be held in contact with the blades in an optimum position for cutting. The suction also serves to remove the growths from the housing and deliver them to a traveling screen belt on the barge. There water is removed from the cut growths, and the growths, now semi-dried, are packaged in an appropriate manner. (Sinha-OEIS) W75-06696

WELLAND CANAL WATER QUALITY CON-TROL EXPERIMENTS (PHASE II),

Department of the Environment, Ottawa (Ontario). Wastewater Technology Centre. E. E. Shannon, F. J. Ludwig, D. T. Vachon, and I. F. Munawar.

Technology Development Report EPS 4-WP-74-10, 59 p, October 1974, Water Pollution Control Directorate. 12 fig, 15 ref, 10 tab, 3 append.

Descriptors: *Water quality control, chemistry, Algae, Biomass, Nutrients, Phosphorus, Chlorophyll, Sampling, Monitoring, Phytoplankton, Zooplankton, Data collections, *Feasibility studies.
Identifiers: *Welland Canal, *Alum, Flocculants,

Turbidity, Treatment costs.

Feasibility studies on the utilization of alum for water quality control in the Fourth Welland Canal were described in an earlier Phase I report by Shannon and Vachon (1973). This report details the results of the full scale alum treatment (dosage of 2.5 mg/l as Al) of the Fourth Canal. The continuing program on the experimental basins is also described. The biological, chemical, and physical characteristics of the Fourth Canal were monitored weekly from April 1973 to March 1974. On the basis of the chlorophyll, total phosphorus, turbidity and water transparency data it was con-cluded that alum treatment was successful in maintaining acceptable water quality in the central and southerly reaches of the canal. The average water quality in the Central reach was equal to, and in some respects superior to, the water quality in the flow-through northerly reach. Because of suspected phosphorus inputs, higher total phosphorus and chlorophyll levels wire evident in the southerly reach. Consequently, it was recommended that alum treatment be repeated in this reach in May 1974. The cost of treating the Fourth Canal in 1973 was \$16,470, or approximately \$90/acre of water surface. Special algal enumeration and identification studies in the experimental basins revealed that the alum treatment was effective in controlling algal biomass. Zooplankton data collected in the experimental basins suggested that alum or sodium aluminate treatments at realistic application levels will not adversely affect natural zooplankton populations. (Environment Canada)

PUBLIC PERCEPTIONS OF WATER QUALITY AND THEIR EFFECT ON WATER-BASED RECREATION,

Department of the Environment, Ottawa (Ontario). Water Planning and Management For primary bibliographic entry see Field 6B. W75-06752

KALAMAZOO COUNTY, MICHIGAN, WATER QUALITY STUDY.

Jones and Henry, Toledo, Ohio. Available from the National Technical Informa-tion Service, Springfield, Va 22161, as PB-235 670, 55.25 in paper copy, \$2.25 in microfiche. Prepared for Kalamazoo Metropolitan County Planning Commission, Kalamazoo, Michigan, August, 1974. 100 p, 30 fig, 3 tab, 19 ref, 4 append. CPA-MI-05-28-0354.

Descriptors: *Water quality control, *Water pollution control, Water resources, *Eutrophication, *Water demand, *Planning, Water quality standards, Water policy, Groundwater resources, Subsurface water, Water distribution, Sewers, Urban drainage, *Michigan.

Identifiers: Observation wells, Kalamazoo River(Mich), Portage Creek(Mich).

With an abundance of well-distributed water resources, Kalamazoo undertook a study to determine existing water quality information to assist the county in developing a comprehensive water management plan. Relying heavily on existing data, reports, and surveys of the hydrologic and geologic conditions, this report analyzes and evaluates this information, and examines the relationship of water quality to water use and water quality standards. Although ground water is of good quality, the surface water has shown degraded water quality resulting from industrial and agricultural effluent. Present water quality requirements vary significantly from industry to industry, as well as for household uses. Increasing eutrophication in lakes and pollution in the Kalamazoo River and Portage Creek, has led to the following recommendations for improving water quality through management: (1) continual sampling and analysis-including expansion of the monitoring system; (2) completion of sanitary sewer projects; (3) designation of observation wells in all land disposal or land storage areas; (4) reduction of withdrawals of water in upper aquifers to prevent salt water intrusion, (5) flushing or urban run-off; and (6) establishment of a county agency responsible for water quality control to hear complaints, administer and coordinate sampling projects and conduct water quality surveys. (Salzman-North W75-06759

EDWARDS AQUIFER, A STUDY OF EDWARDS RECHARGE ZONE REQUIREMENTS, AACOG WATER QUALITY PLANNING, PHASE 5,

Alamo Area Council of Governments, San Antonio, Tex.

For primary bibliographic entry see Field 4B. W75-06761

COLORADO RIVER SALINITY, NEW SOLU-TIONS TO AN OLD PROBLEM. Reclamation ERA, Vol 60, No 4, p 1-7, Autumn

1974.6 fig.

Descriptors: *Colorado River Basin, *Mexican Water Treaty, *Salinity, *Water management(Applied), Water resources development, Colorado River, *Mexico, Water resources, Colorado, Irrigation.

Identifiers: Imperial Dam, Bureau of Reclamation, Paradox Valley Unit(Colo), Grand Valley Basin Unit(Colo), Crystal Geyser Unit(Utah), Las Vegas Wash Unit(Nev)

Water quality on the Colorado River will be enhanced due to recent passage of Federal legisla-tion authorizing a \$280.6 million program aimed at controlling the river's salinity. A formal protest from Mexico started a series of negotiations and agreements intended to reduce river salinity at the border and provided basis for the legislation. Users in both United States and Mexico will benefit. It also authorizes \$125 million for salinity control projects upstream from Imperial Dam to improve water quality in the Lower Basin. Bureau of Reclamation is the primary agency constructing facilities to carry out the salinity program. Present regional economic loss is estimated at \$53 million due to crop failures, poor soil and other results of high saline concentrations. Almost 10 million tons of salts and other minerals are picked up by the river as it flows from its headwaters to Mexico. Salinity levels range from less than 50 parts per

Field 5-WATER QUALITY MANAGEMENT AND PROTECTION

Group 5G-Water Quality Control

million at headwaters to an average of about 850 million parts per million at Imperial Dam near Yuma, Arizona. A large desalting complex will be built near Yuma plus facilities to manage, treat and dispose of drainage return flows from the Wellton-Mohawk Irrigation District, a significant salinity source. Funds will also provide a protective pump ing well field, repairs to 49 miles of Coachella Canal to reduce conveyance losses, and salinity control measures at Paradox Valley Unit, Colo., Grand Valley Basin Unit, Colo., Crystal Geyser Unit, Utah, and Las Vegas Wash Unit, Utah. (Salzman-North Carolina) W75-06774

THE INTERCOASTAL WATERWAY: AN ECOLOGICAL PERSPECTIVE, Florida Atlantic Univ., Boca Raton. Dept. of

Biological Sciences. G. A. Marsh.

Florida Environmental and Urban Issues, Vol II, No 2, p 6-7, 13-15, November, 1974. 1 fig.

faces, *Estuaries, *Encroachment, Water resource management, *Marine animals, Water pollution control, Water quality control, *Florida, Ecology.

Hentifiers: South Florida's Atlantic Intracoastal Waterway(ICWW), Palm Beach County(Fla), Broward County(Fla), Dade County(Fla).

South Florida's Atlantic Intracoastal Waterway (ICWW) interconnects a series of natural lakes, bays and lagoons which are separated from the ocean by islands and peninsulas which form the Gold Coast. ICWW provides a protected boating passage linking the coastal municipalities and serves the recreational, drainage and waste disposal needs of Palm Beach, Broward and Dade Counties. Environmentally degrading changes to inland marine waters have resulted from population growth. Water quality has declined and demand for waterfront acreage has brought devastation to natural shoreline vegetation and proliferation of finger canal development adjoining the waterway. Despite pollution, ICWW remains a habitat for many forms of marine and estuarine life. Fresh water is added to waterways by increased urban run-off and land drainage thereby reducing saline content and killing marine and estuarine species. Control facilities to treat effluent of partially or non-treated solutions and sur-face run-off, both agricultural and urban, have been implemented. Pathogenic microorganisms are evident, which underlines the urgent need for water chemistry analysis, guidelines, and legislation for regulatory design criteria for future canal development. (Salzman-North Carolina) W75-06776

REPORT ON THE CHARLES RIVER: A STUDY

OF WATER POLLUTION, Massachusetts Water Resources Commission, Boston. Div. of Water Pollution Control. For primary bibliographic entry see Field 5B.

KEY LAND USE ISSUES FACING EPA.

Harbridge House, Inc., Boston, Mass. Available from the National Technical Informaon Service, Springfield, Va 22161 as PB-235 345, \$10.25 in paper copy, \$2.25 in microfiche. Environ-mental Protection Agency, Washington, D.C., Of-fice of Planning and Evaluation Report EPA 230/3-74-011, February 1974, 371 p, 13 fig, 8 tab, 7 ap-pend. BOA-68-01-1561.

*Land use, *Planning. Descriptors: *Environmental quality, Land management, Natural resources, Air pollution, Water pollution, Ther-mal pollution, Environmental effects, Water pollu-

Identifiers: Land use planning, Locational siting, Agricultural land use, Industrial siting.

Land use issues of concern to EPA policy makers either because of projected trends, patterns, timing, and/or magnitude of their environmental impact are identified and assessed. First divided into major categories like transportation or agriculture. land use issues are analyzed by growth and development patterns and siting of key facilities (location). Focus is four-fold: (1) identify current land use problems, (2) determine trends and projections impacting future land use problems, (3) develop methodology for assessing relative im-portance of the issues in light of EPA's concerns and responsibilities, and (4) identify gaps in information and/or policy that prohibit a complete assessment. Data include nationwide patterns of land use, environmental impacts on air, water and land, and present land use projects and programs. Each land use issue is viewed in terms of its direct pollution impact and indirect effects of future use The direct link between man's use of the land and total environmental quality is underscored as the full-cycle of the cause-effect relationship is examined. Coordination between planning, review and implementation of policies affecting land use involving all political jurisdictions is necessary. (Salzman-North Carolina) W75-06780

A REVIEW OF THE PRESENT AND ANNOUNCED FUTURE CAPABILITIES FOR COMMERCIAL OIL RECOVERY BEYOND COMMERCIAL OIL RECOVERY BEYOND THE 656 FOOT ISOBATH, State Univ. of New York, Stony Brook. Marine

Sciences Research Center.

L. C. Leopold.

Marine Affairs Journal, Number 1, p 91-97, December 1973.

Descriptors: Oil, *Oil fields, Exploitation, *Oil industry, *Drilling, *Exploration, recovery(Oil), *Economic *Secondary efficiency, Investment, International waters, Oil wells, Legislation.

Identifiers: Submersible Production System, Rigs, Drilling

This is a brief look at the commitment of the oil industry to deep offshore exploitation. A tabulation inventory of drilling rigs was undertaken to illustrate what the usage level was at the time of the counts. Considering that no growth in 600 plus foot group has occurred until now, the 38 new rigs reflect the conclusion that 600 plus foot water is now an economically justified depth. The latter part of the article is a synthesis of reports which help to define the degree of commitment and present capabilities to economic oil recovery beyond 656 feet. ESSO's Submersible Production System is just one of several methods which proves the feasibility of drilling for oil at these depths. As new shore basins are discovered, new deep-water production systems generated and oil demand continues, deep drilling in coastal areas will continue. The only foreseeable deterrents are the regulation in natural gas prices and the shortage of construction equipment. Continual capital and manpower investment points to the oil industry's interest in deep-well drilling. (Salzman-North Carolina) W75-06791

SET PROBE OF POLLUTION CONTROL AMENDMENTS.

Engineering News and Record, Vol 193, No 7, p 24. August 8, 1974.

*Waste Descriptors: treatment. *Costs *Industrial wastes, *Municipal wastes, Pulp and paper industry, Chemical is *Administrative agencies, Economic Federal Water Pollution Control Act. Identifiers: 1972 Amendments.

Five contracts have been awarded by the National Commission on Water Quality for studies of the impact of the Federal Water Pollution Control Act

Amendments of 1972. The studies are on the cost to municipalities and industries of meeting the effluent limitations of the law and possible sources of local funding for municipalities building waste treatment plants; and studies on petroleum refining, iron and steel, pulp and paper, and organic micals industries which include examinations of alternative methods of waste treatment and associated costs, quality of effluent with various methods and materials and energy requirements. (Orr-FIRL)

LINKS WITH WATER RESOURCES AND LAND USE PLANNING STRESSED AT CORNELL CONFERENCE.

Civil Engineering-ASCE, Vol 44, No. 8, p 92-94, August, 1974.

Descriptors: *Conferences, *Water quality
*Planning, *Alternative planning, Futur
planning(Projected), Project planning, Sewers
Water pollution sources, Land use, Management. Future Sewers.

Highlights of the first water quality planning con-ference held at Cornell University in June 1974 are outlined. Points discussed include the implementing of plans, better planning of river basins, water quality linked with land use, sewers as a dominant factor in controlling urban growth, Pennsylvania's systematic approach to planning, and the significance of non-point source pollution. (Sandoski-W75-06828

EXPERIMENTAL OIL SKIMMER.

Mechanical Engineering, Vol 96, No 8, p 48, August, 1974. 1 fig.

Descriptors: *Oils spills, *Oceans, *Oil skimmers, Recovery, Equipment, California, Separation techniques, Pollution abatement. Identifiers: Oil-recovery capacities, Survival test(Equipment).

A test was run on an oil skimmer which could be used for emergency oil spills at high seas. This system built by Lockheed Missiles and Space Company, was tested by riding it (with Coast Guard escorts) through a storm off the northern California coast. The oil-recovery capacities are up to 1000 gallons of oil per minute. A disc-drum revolves in an oil-water mix, oil adheres to the discs and free water runs off, and the oil is carried past wipers that direct it to a hollow axle. Oil then is pumped from the machine to storage containers. The machine is designed to be carried to an airport near an oil-spill site, assembled in an hour, and towed or carried on a buoy tender to the work area. (Prague-FIRL) W75-06830

NINE MILLION GALLONS PER MINUTE DOWN THE DRAIN, FEDERAL GUIDELINES PRESENT A TOUGH CHALLENGE, Canadian Petroleum, Vol 15, No 7, p 40-42, July,

Descriptors: *Water quality control, *Industrial water, *Canada, *Industries, Industrial wastes, Environmental control, Waste water treatment, Water quality standards, Effluents, Heavy metals.

With their introduction of water quality guidelines in 1973, Environment Canada has emphasized the reduction of effluent BOD and the elimination of such contaminants as cyanides. The federal standards are not nearly as precise on the tolerable levels of heavy metals since not enough is known about the interaction of various metals. A description of various industrial pollutants, their effects, industrial problems, and treatment methods and materials is provided. (Sandoski-FIRL) W75-06834

6. WATER RESOURCES **PLANNING**

6A. Techniques Of Planning

STOCHASTIC VARIATIONS IN WATER QUALITY PARAMETERS, Rutgers - the State Univ., New Brunswick, N. J. Bureau of Engineering Research. For primary bibliographic entry see Field 5B. W75-06355

CONFIDENCE LIMITS FOR DESIGN EVENTS, Department of the Environment, Ottawa (Ontario). Water Resources Branch. For primary bibliographic entry see Field 2E. W75-06544

BIRTH-DEATH MODELS FOR DIFFERENTIAL PERSISTENCE, Harvard Unov., Boston, Mass. Graduate School

of Business Administration. For primary bibliographic entry see Field 2E. W75-06546

COMPREHENSIVE WATER QUALITY MANAGEMENT PLANNING,

Pennsylvania Dept. of Environmental Resources, Harrisburg. Office of Comprehensive Water and Wastewater Management Planning. For primary bibliographic entry see Field 5G. W75-06558

ANALYSIS OF MULTIPLE OBJECTIVES IN WATER QUALITY,

Case Western Reserve Univ., Cleveland, Ohio. Systems Engineering Div. For primary bibliographic entry see Field 5D. W75-06559

STEADY-STATE WATER QUALITY MODEL-

SIEADY-STATE WATER QUALITY MODEL-ING IN STREAMS, Cornell Univ., thaca, N.Y. School of Civil and Environmental Engineering. For primary bibliographic entry see Field 5B. W75-06564

ECONOMIC FORECASTING FOR VIRGINIA'S

WATER RESOURCE PROGRAMS, Virginia State Water Control Board, Richmond. For primary bibliographic entry see Field 6B. W75-06573

URBAN SYSTEMS ENGINEERING DEMONSTRATION PROGRAM: INFORMATION SUM-MARY FOR WATERWORKS, SANITARY SEWERAGE, SOLID WASTE MANAGEMENT, STORM DRAINAGE AND FLOOD PLAIN MANAGEMENT, Diversified Consultants, Inc., Jackson, Miss. J. A. Elliott, R. L. Waters, and A. P. Desmarais.

The Gulf Regional Planning Commission, Gulf-port, Mississippi, 1973. 59 p, 16 tab. MS-04-25-1001. MS-04-2501001.

Descriptors: *Comprehensive planning, *Mississippi, *Urbanization, *Regional analysis, Sewerage, Surveys, Urban drainage, Forecasting, Solid wastes, Data collections, Water supply, Flood plains, Storm water.

A comprehensive plan was developed for the four-county region of the Gulf Regional Planning Com-mission. The plan dealt with the subjects of waterworks, sanitary sewerage, solid waste management, storm drainage, and flood plan management. A five-volume report of the study was prepared. This report summarizing these volumes. The study

area had a 1970 population of 268,000. Total land area is 2,600 acres and land use forecasts do not predict large scale development of presently undeveloped areas. The area's economy is helped by an abundance of natural resources. Tourism, government, agriculture and manufacturing are four major components of the economic base. Six general objectives were formulated for the study, including: (1) reliable projections and data on future and existing services in each of the fields studies, (2) the development of short-range and longrange plans, (3) development of regional public policies for orderly development, (4) encouragement of consolidation of small utility systems, (5) development and/or refinement of tools to imp ment the plan, and (6) periodic review of local regulations and policies to insure that they are in accordance with the overall objectives. Requirements for each area of the program are outlined up to year 1990. Total cost of the programs is estimated at \$204.2 million with sanitary sewerage being the most expensive (\$147.1 million) and solid waste management the least expensive (\$1.0 million). (Poertner) W75-06673

6B. Evaluation Process

LAND-USE ISSUES: PROCEEDINGS OF A CON-FERENCE

Virginia Polytechnic Inst. and State Univ., Blacksburg, Water Resources Research Center. For primary bibliographic entry see Field 4A. W75-06359

ATTITUDES TOWARD WATER USE PRAC-TICES AMONG S.E. IDAHO FARMERS: A STUDY ON ADOPTION OF IRRIGATION

SCHEDULING, Idaho Univ., Moscow. Dept. of Agricultural and For primary bibliographic entry see Field 3F.

W75-06363

SALINITY IN WATER RESOURCES. For primary bibliographic entry see Field 3C. W75-06366

CURRENT APPROACHES AND ALTERNATIVES TO SALINITY MANAGEMENT IN THE COLORADO RIVER BASIN,

Bureau of Reclamation, Denver, Colo. For primary bibliographic entry see Field 3C. W75-06367

ECONOMIC ANALYSIS OF OPTIMAL USE OF SALINE WATER IN IRRIGATION AND THE EVALUATION OF WATER QUALITY,

Hebrew Univ., Jerusalem (Israel). Dept. of Agricultural Economics. For primary bibliographic entry see Field 3C. W75-06370

EVALUATING AGRICULTURAL EFFECTS OF SALINITY ABATEMENT PROJECTS IN THE COLORADO RIVER BASIN: AGRONOMIC AND ECONOMIC CONSIDERATIONS, Colorado State Univ., Fort Collins. Dept. of

Economics. For primary bibliographic entry see Field 5G.

FINDING KNOWLEDGE GAPS: THE KEY TO SALINITY CONTROL SOLUTIONS,

Colorado State Univ., Fort Collins. Environmental Resources Center.

or primary bibliographic entry see Field 5G. W75-06375

HYDROGEOLOGY AND WATER QUALITY MANAGEMENT, Moody and Associates, Inc., Harrisburg, Pa. En-

vironmental Services Div. For primary bibliographic entry see Field 5G.

POLICY AND RESEARCH IMPLICATIONS OF THE NATIONAL WATER COMMISSION'S RECOMMENDATIONS,

Wisconsin Univ., Madison. Dept. of Agricultural Economics. For primary bibliographic entry see Field 6E. W75-06404

A COMPILATION OF AUSTRALIAN WATER QUALITY CRITERIA, Caulfield Inst. of Tech., (Australia).

For primary bibliographic entry see Field 5G. W75-06418

CONTROL IN COMMUNITY FLOOD PLANNING,

California Univ., Berkeley. Dept. of Landscape Architecture.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 973, \$5.75 in paper copy, \$2.25 in microfiche. Masters Thesis, June 1972. 139 p, 21 fig, 55 ref. (California Water Resources Center Project UCAL-WRC-W-289). OWRT-B-128-CAL(2).

Descriptors: *Flood control, *Water management(Applied), "Flood protection, Streamflow, "California, Planning, "Community development, Project planning, Water demands. Identifiers: *Sonoma Valley(Calif).

In the semi-arid west, of which central California is a part, natural free flowing streams are in shorter supply than they are in more humid clishorter supply than they are in into all and mates, and therefore they are more precious. A large population in the State and extensive development of irrigated agriculture have made great demands on the limited water supply. Consequently, the dam and reservoir are becoming quite characteristic of California. In the Sonoma Valley urban pressures have not been great because the valley is by-passed by the freeway system. The population in the valley has grown slowly through the last few decades. A new highway and a new increase in housing construc-tion is sure to come, most likely in this decade. In the meanwhile, options are still open in the the meanwhile, options are still open in the Sonoma Valley to plan now for a future which includes the natural, freeflowing streams and use them for many purposs, including flood control, which will not destroy them. Several possible means of managing flood waters in the valley are analyzed, values of the natural waterways are described, and a program is proposed to reduce the problems associated with Sonoma Creek by the problems associated with Sonoma Creek by utilizing its values rather than destroying them. (Snyder-California, Davis) W75-06429

REPORT TO THE SONOMA CREEK ADVISO-RY COMMITTEE, SONOMA, CALIFORNIA, California Univ., Berkeley. Dept. of Landscape Architecture.

M. K. Robinson.

Available from the National Technical Informa-Available from the National Technical Informa-tion Service, Springfield, Va 22161 as PB-241 015, \$3.75 in paper copy, \$2.25 in microfiche. Research Report, February, 1971. 35 p, 6 fig, 17 ref. (California Water Resources Center Project UCAL-WRC-W-289). OWRT-B-128-CAL(1).

Descriptors: *Water management(Applied), *Flood control, *Streamflow, *California, Streams, *Social values, Economics, Floods, Management, Environment, Programs, Project planning. planning. Identifiers: *Sonoma Valley(Calif).

Field 6-WATER RESOURCES PLANNING

Group 6B—Evaluation Process

A creek is seen differently by different people. To some it is primarily the source of floods and conditions which inhibit the economic development of the basin. Others feel equally strongly that the beauty and refreshment that a natural waterway brings to the environment adds a value to the lives of the people in the community which outweighs possible economic returns if the creek were destroyed. Several possible means of managing flood waters in the valley are analyzed, values of the natural waterways are described, and a program is proposed to reduce the problems as-sociated with Sonoma Creek by utilizing its values rather than destroying them. (Snyder-California, Davis)

SURFACE WATER QUALITY IN MINNESOTA: THE TRANSLATION OF GOALS AND POLI-CIES INTO RESULTS,

Minnesota Univ., St. Paul. Water Resources Research Center.

For primary bibliographic entry see Field 5G. W75-06431

CHARACTERISTICS OF WYOMING STOCK-WATER PONDS AND DIKE SPREADER SYSTEMS,

Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 4A.

W75-06433

RATIONAL **PROTECTION** OF WATER RESOURCES IN COASTAL ZONES THROUGH PLANNED DEVELOPMENT,

Florida Univ., Gainesville. Dept. of Civil and Coastal Engineering.

For primary bibliographic entry see Field 4B. W75-06446

RESERVATION, RESERVOIR AND SELF-DETERMINATION: A CASE STUDY OF RESERVOIR PLANNING AS IT AFFECTS AN INDIAN RESERVATION, Mississippi State Univ., Mississippi State. Dept. of Anthropology. J. H. Peterson, Jr.

Available from the National Technical Inform tion Service, Springfield, Va 22161, as PB-241 100, \$3.75 in paper copy, \$2.25 in microfiche. Mississip-pi Water Resources Research Institute, Mississippi State, Completion Report, 1975. 36 p, 15 ref. OWRT A-076-MISS(1).

Descriptors: Water resources development, Social Descriptors: water resources development, Social values, "Indian reservations, Reservation Doc-trine, Reservoirs, "Mississippi, Planning, At-titudes, "Social change, "Social impact, Public lands, Federal reservations. Identifiers: "Choctaw-Indians, Edinburg

A case study is presented of Indian tribal govern-ment and relationships between the tribe and various governmental agencies, with respect to water resources development and augmentation of income for the tribe. Specifically, the reaction of the Mississippi Choctaw Indians to the proposed Edinburg dam and reservoir, which will inundate some of the tribal lands, is discussed. There appears to be the possibility that the tribe might benefit from increased recreational activities in the area and from increased tourism, upon area and from increased tourism, upon pletion of the reservoir project. (Priest-Mississippi State) W75-06462

THE EFFECTS OF DIMINISHED GROUND-WATER SUPPLIES ON SELECTED NEW HAMPSHIRE INDUSTRIES: AN ECONOMIC AND LEGAL EVALUATION,
New Hampshire Univ., Durham. Water Resource
Research Center.

For primary bibliographic entry see Field 4B.

REDESIGNING FLOOD MANAGEMENT - PRO-

JECT AGNES PHASE I, New York State Coll. of Agriculture and Life Dept. Ithaca. of Agricultural Economics.

For primary bibliographic entry see Field 6F. W75-06520

RESEARCH ON WATER RESOURCES EVALUATION METHODOLOGY, A RIVER BASIN ECONOMIC AND FINANCIAL POST-AUDIT

Little (Arthur D.), Inc., Cambridge, Mass.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 061, \$7.25 in paper copy, \$2.25 in microfiche. Completion Report, March 31, 1975. 202 p, 51 tab, 123 ref. OWRT C-5126(4228)(1). 14-31-0001-4228.

Descriptors: *Evaluation, *Methodology, *Costbenefit analysis, *Water resources development,
*Planning, *Operations, *Investments, *Investments, Economics, *Financing, Hydrology, Flood control, Hydroelectric power, Irrigation, Navigation, Recreation, Water supply, Fish, Wildlife, Legal aspects, *Project post-evaluation, Missouri River. Identifiers: *Post-audit analysis.

Benefit-cost analysis has long been relied upon as a tool for planning and justifying river-basin programs. Almost no record is kept of actual benefit accruals to compare with planning expectations. This postaudit of the Pick-Sloan Missouri Basin Program attempted to quantify the 30-year performance of multipurpose programs in dollar terms. Applying current evaluation Principles and Standards of the Water Resources Council on an ex-post basis, the objective was to determine how much physical and dollar realities have differed from original plans, why they have differed, and implications for future planning. hat are the Because benefit estimating procedures remain so imperfect, a wide range of values could be quantified; however, it appears that flood control and electric power program performance far exceeded plan, while that for irrigation and navigation programs fell far short of plan. Benefits could be dou-ble or half most of those estimated in this post-audit, depending on value assumptions. Also, external forces have radically altered original plans. Together, these uncertainties and imperfections render benefit-cost analysis and long range planning of questionable utility and very misleading as measures for program justification. A rigorous financial test of project worth is recomended W75-06524

ATTITUDES OF IDAHO RESIDENTS TOWARD FREE FLOWING RIVERS AS A WATER USE IN

Idaho Univ., Moscow. Dept. of Sociology and Anthropology.
J. E. Carlson.

Available from the National Technical Information tion Service, Springfield, Va 22161 as PB-241 453, \$4.25 in paper copy, \$2.25 in microfiche. Idaho Water Resources Research Institute, Moscow, Completion Report, Scenic Rivers Study Report No. 12, October 1974. 55 p, 3 fig, 14 tab, 8 ref, ap-pend. OWRT C-3342(3718)(5).

*Idaho, *Water utilization, *Attitudes, Social values, *Wild rivers, Running waters, Natural resources, Social aspects, Land use, Surveys, *Priorities, Classification

This study was designed to determine: (1) the relative position of natural resources among other areas of concern to the people of Idaho, and (2) the relative importance of wild rivers as a water use in

Idaho. There was a 91 percent return rate for the interviewer administered questionnaire. Idaho residents rank various natural resource uses high in priority. These high priority uses tend to be both in the areas of utilization and preservation suggesting that Idaho residents tend to approach resource use from a balanced perspective. The highly con-troversial area of wild and scenic river classifica-tion is supported by the study in that attitudes toward having more wild rivers in Idaho tend to be somewhat polarized at the extremes of the response categories. Attitudinal questions should not be taken at face value but must be considered in light of the person's overall priority rankings regarding resource use. Looking only at attitudes may provide misleading results. W75-06525

COMPREHENSIVE QUALITY MANAGEMENT PLANNING,

Pennsylvania Dept. of Environmental Resources, Harrisburg. Office of Comprehensive Water and Wastewater Management Planning. For primary bibliographic entry see Field 5G. W75-06558

WATER QUALITY MANAGEMENT: THE CASE FOR RIVER BASIN AUTHORITIES, Ohio Univ., Athens. Dept. of Civil Engineering. For primary bibliographic entry see Field 5G. W75-06571

ECONOMIC FORECASTING FOR VIRGINIA'S WATER RESOURCE PROGRAMS, Virginia State Water Control Board, Richmond. C. P. Becker, A. M. Griffin, Jr., and C. S. Lown. Water Resources Bulletin, Vol 9, No 5, p 963-975, October 1973. 3 fig. 4 ref.

Descriptors: *Economics, *Forecasting, *Water resources, *Virginia, Planning, Population, Projections, Unemployment, Insurance, Statistics, Projects, Water quality, Management, Data collections, Computers, Regions.
Identifiers: Industrial activity, Payroll data,
Economic data, Hydrologic area, Exponential
forecasting, Employment records.

Water resource and water quality managem planning depend, to a large degree, on forecasts of industrial activity and population projections. A flexible economic data base is important where planning follows varying formats of geographical and industrial detail. Records of employment and payroll collected in the administration of Unem-ployment Insurance (U.I.) programs are available ployment Insurance (U.I.) programs are available from State Employment Agencies. Many years of record are available on punched cards or magnetic tape and may be arrayed and manipulated by computer. This basic approach has been followed in Virginia. Historical U.I. payroll and employment records for 1956-1970 were procured on mensation records for 1956-1970 were procured on magnetic tape. The data were arrayed by major hydrologic area and by regional planning district. Projections of manufacturing activity were then generated by fitting several exponential equations to annual payroll data in two-digit Standard Industrial Classifications. Then these exponentials were extrapoated to provide a range of industrial projections. Other parameters of manufacturing activity were then correlated to the payroll data to generate projections of indexes such as employment, va added, and gross manufacturing output. U.I. payroll data are now being correlated to paramein non-manufacturing categories. Projection for industries such as trade and services will link extrapolated payroll data with benchmark correlations of payroll and sales receipts. (Bell-Cornell) W75-06573

MAN'S ACTIVITIES IN WATERSHED AREAS-A NEED FOR PLANNING, For primary bibliographic entry see Field 4D. W75-06588

AESTHETICS OF WILD AND SCENIC RIVERS A METHODOLOGICAL APPROACH,

Idaho Univ., Moscow. Dept. of Agricultural and Forest Economics.

E. L. Michalson.

Available from the National Technical Information Service, Springfield, Va 22161, as PB-241 134, \$5.75 in paper copy, \$2.25 in microfiche. Idaho Water Resources Research Institute, Moscow, Completion Report, Scenic Rivers Study No 11, October 1974, 139 p, 9 tab, 10 ref, 2 append. OWRT C-3342(No 3718)(5).

Descriptors: *Idaho, *Aesthetics, *Wild rivers, Methodology, Evaluation, Recreation demand, Social values, Attitudes, Social aspects, Psychological aspects.

Identifiers: *Scenic rivers, *Salmon River(Idaho), Consumer surplus.

The specific objectives were to define outstandingly scenic areas of the Salmon River, and to evaluate methods of establishing values for aesthetic experiences. Two attempts were made to use the slides developed in the inventory process of the Salmon River to obtain audience response from a slide showing. The responses from the au-diences were neither consistent nor did they form a concensus of opinion. The next procedure used was to develop recreational demand equations for several areas of Idaho. As a part of the demand analysis the consumer surplus was estimated for each area and the value of aesthetics was related to the amount of consumer surplus in each area. This was done by designing a scaling questionnaire which allowed the recreational users interviewed to rank a bundle of recreational experiences. These rankings were then summed and a summated Likert-Type scale analysis was used to develop a distribution which ranked the experiences. The Likert-Type scale, as developed for this study, indicates the way recreationists would distribute the value of their experiences among the several categories. While the Likert-Type scale analysis most likely underestimates the value of aesthetics, it is a useful approximation of the quantification of aesthetic valu W75-06641

ORGANIZATIONAL PROBLEM-SOLVING,

Kansas Water Resources Research Inst., Manhat-

R. L. Swinth.

Available from the National Technical Information Service, Springfield, Va 22161, as PB-241 136, \$17.00 in paper copy, \$2.25 in microfiche. Contribution No 148. November, 1974. 182 p. OWRT B-026-KAN(1).

Descriptors: To carry out its planning activities an organization will often follow an authority aporganization will often tollow an authority ap-proach. This traditional method has significant limitations. Yet, planning and problem-solving can be dealt with differently. On the other hand or ganizations can effectively solve novel and com-plex tasks by organizational joint problem-solving. This approach is characterized by a set of propositions formulated to describe how responsibility is distributed and how search and coordination are facilitated. These procedures have been evaluated jointly by field study and laboratory study. An analysis was conducted to establish the relationship between the performance of various project groups, such as the Corps of Engineers, and their use of various problem-solving techniques. People were aided and trained in the use of organizational joint problem-solving procedures to assess whether their performance was better than those who were not. W75-06643

ELEMENTS IN A DECISION FRAMEWORK FOR PLANNING THE ALLOCATION OF COASTAL LAND AND WATER RESOURCES

WITH ILLUSTRATION FOR A COASTAL COMMUNITY, Massachusetts Univ., Amherst. Dept. of Agricul-

tural and Food Economics.

R. N. Allbee, and D. A. Storey. Available from the National Technical Information Service, Springfield, Va 22161, as PB-241 138, \$4.75 in paper copy, \$2.25 in microfiche. Massachusetts Water Resources Research Center, Completion Report FY-74-3, Publication No 36, 1973. 78 p. OWRT A-046-MASS(1).

Descriptors: *Massachusetts, *Decision making, *Planning, Land use, Coasts, *Water alloca-tion(Policy), Community development, Water resources development, *Optimization, Coastal marshes, State governments, Social values, Systems analysis, *Feasibility studies, Urbanization, Management, Multiple purpose projects, *Economic impact, Regional analysis.
Identifiers: *Coastal zone management. *Ipswich(Mass).

Analytical methodologies are considered under two broad headings: optimality analysis and feasibility analysis. Optimization techniques include mathematical programming, which is very precise but not highly capable of handling multiple objectives and intangibles, and simulation, better suited to the problem but very expensive. Feasibility analysis techniques do not necessarily reveal the best or optimal allocation but give procedures for choosing among alternatives being analyzed. A matrix approach which relates possible or projected changes in different human activities to the set of multiple objectives through measurement of tangible and intangible impacts is developed and il-lustrated. A suggested supplement would further break down the impacts among different groups of citizens. Illustration of the decision framework is provided for Ipswich, Massachusetts, a commun ty of roughly 11,000 people with extensive salt marshes and clam flats, a large quasi-public beach area (Crane's Beach) and relatively little waterfront development except for one residential cluster. The illustration is based mainly on secondary data. Primary data requirements and analytical procedures are suggested. In order to account for the full range of social values associated with coastal resources, much of the public planning should take place at a higher level of government than the local community, chiefly at the state level. W75-06645

PROCEEDINGS OF CONFERENCE "TRENDS IN WATER MANAGEMENT", Minnesota Univ., St. Paul. Water Resources Research Center. For primary bibliographic entry see Field 6E. W75-06647

RESOURCES APPRAISAL HYDROELECTRIC LICENSING, SANTEE RIVER BASIN, SOUTH CAROLINA-NORTH CAROLINA. Federal Power Commission, Washington, D.C. Bureau of Power. 1970. 127 p, 82 fig, 36 tab.

Descriptors: "Hydroelectric project licensing, "South Carolina, "North Carolina, "Hydroelectric plants, "River basin development, River systems, Water resources development, River basins, Rivers and Harbors Act. Identifiers: *Santee River Basin.

The major headwater tributaries of the Santee River, the Wateree-Catawba, the Broad, and the Saluda, rise in the Blue Ridge mountain region of northwestern South Carolina and central North Carolina. Most of the flow of the Santee River is diverted 87 miles above its mouth into the Coop River, a short coastal stream, which is used for the tail canal of the Pinopolis power plant, and emp-ties into the Atlantic Ocean at Charleston. It is expected that by the year 2000 the basin population will be about 4,370,000. Approximately 19 percent of the area in the Santee River Basin, with 9 percent of the population, has been classed as eligible for assistance under the 1965 Public Works and Economic Development Act (PL 89-136). Of the basin sites studied for future development of water and related land resources, only four offer possibilities for favorable economic development using Federal financing. These are the Saluda (Green River), Clinchfield, Greater Lockhart (with either conventional or pumped storage capacity), and Blairs projects. The redivision of Santee River waters from the Cooper River through a proposed powerhouse at St. Stephen has been authorized by the River and Harbor Act of 1968 (PL 90-483). (Poertner) W75-06655

FOR WATER RESOURCE APPRAISAL HYDROELECTRIC LICENSING, WISCONSIN RIVER BASIN, WISCONSIN. Federal Power Commission, Washington, D.C.

Bureau of Power.

Appraisal Report, 1969. 98 p, 28 tab, 62 fig.

Descriptors: *Hydroelectric plants, *Wisconsin, *Hydroelectric project licensing, *River basin development, Utilities, River systems, Water resources development, Recreation, Flood control, Water supply, Water quality control, Erosion control, Fish and wildlife, River basins. Identifiers: *Wisconsin River Basin.

The electric power needs of the 11,728 square mile Wisconsin River Basin are supplied by three privately-owned utilities. The basin has potential for development and utilization of its water resources in the interest of flood control, water supply, water quality control, recreation, cooling water for steam-electric generating plants, and scenic river areas. Future development is being studied and utilization of the basins water resources are under consideration for either relicensing or Federal takeover by eleven existing hydroelectric projects. The eleven projects are in reasonable good condition and should be capable of being operated efficiently for an extended period after their licenses expire. Some additional recreational facilities should be provided at all existing projects under consideration to satisfy future demands. Future improvement of water quality in the Wisconsin River below Rhinelander would expand and increase the opportunities for recreational use. The quality of the water is satisfactory for recreational activities at the two upstream existing projects under consideration, Otter Rapids and Rhinelander. (Poertner) W75-06676

LANE COUNTY PRELIMINARY GENERAL PLAN-WATER QUALITY REPORT. Lane Council of Governments, Eugene, Oreg. For primary bibliographic entry see Field 5B.

PUBLIC PERCEPTIONS OF WATER QUALITY AND THEIR EFFECT ON WATER-BASED RECREATION,

Department of the Environment, Ottawa (Ontario). Water Planning and Management

Brancn.
J.G. M. Parkes.
Social Science Series No 8, 53 p, 1973, (Inland Waters Directorate, available in English and French.) 6 fig, 34 tab, 20 ref, 2 append.

Descriptors: "Water quality, "Recreation, "Psychological aspects, Surveys, Planning, Water pollution effects, Pollution abatement, Costs, So-

podution effects, Foliution acatemient, Coss, So-cial aspects, Attitudes, *Canada. Identifiers: *Public perception, Questionnaires, Water quality improvement, Saskatchewan, Quebec, Nova Scotia, Environmental perception.

Field 6-WATER RESOURCES PLANNING

Group 6B—Evaluation Process

This study was part of the Department of the Environment's summer student shoreline survey program. The objectives were to examine the public's perception of water quality, the influence of water quality on water-oriented recreation, and the willingness of the public to pay for improvement. The areas selected for study represent three distinct recreational environments: The Maritime Coast of Nova Scotia, The Eastern Township Area of Quebec, and the Plains of Saskatchewan. The data gathered concerning recreational use patterns and population characteristics at these sites are intended to be used for future planning. (Environment Canada)

ASSESSMENT: IMPACT ANALYTIC BIBLIOGRAPHY, Brown Univ., Providence, R.I.

M. A. Shields.

Prepared for Army Engineer Institute for Water Resources, Fort Belvoir, Virginia. IWR Paper 74-P6, Oct., 1974, 129 p, 40 ref, 3 append.

Descriptors: *Bibliographies, Social impact, *Research and development, *Planning, Social aspects, Water resources development, Information retrieval, Publications, Information exchange. Identifiers: *Social Impact Assessment(SIA), Information systems, Programmatic essay.

Intent was to organize and evaluate the existing knowledge base gained through social science research in order to identify research gaps and create the basis for a working bibliography intended for both scholars and practitioners. Three sources of reference, Office of Water Resources Research abstracts, authors' citations, and references from colleagues were used to develop both a raw and annotated bibliography, lists of descriptors, identifiers and locators, and methological approaches to social impact assessment. Social Impact Studies(SIA), required by the Corps of Engineers as part of their planning process, fall into several categories: demographic, institutional, economic, community, cohesion, lifestyles, displacement and relocation. These topics are given expository analysis using significant studies to illustrate important points. Methodological approaches to social impact assessment are presented in tabular form. As SIA gains in importance as an operational function in the government planning process, this reference which can be continually updated and revised can serve as a valuable aid to planners in making better decisions regarding the impacts of public works projects. (Salzman-North Carolina)

EVALUATION OF FOUR COMPLETED SMALL WATERSHED PROJECTS: SOUTH CAROLINA, MARYLAND, IDAHO-NEVADA, AND WEST VIRGINIA.

Economic Research Service, Washington, D.C. For primary bibliographic entry see Field 4D. W75-06765

PROSPECTUS FOR REGIONAL SEWER AND WATER PLANNING.

Southwestern Wisconsin Regional Planning Commission. Platteville.

For primary bibliographic entry see Field 5D. W75-06782

SOVEREIGNTY OF THE SEAS AND THE EF-FECT UPON NAVAL STRATEGY, Naval War Coll., Newport, R.I.

For primary bibliographic entry see Field 6E.

COMPREHENSIVE LAND USE PLANNING-ITS DEVELOPMENT AND POTENTIAL IMPACT ON COASTAL ZONE MANAGEMENT, Rhode Island Univ., Kingston. Marine Affairs

For primary bibliographic entry see Field 4A. W75-06787

ORGANIZING NEW ENGLAND COMMERCIAL FISHERMEN AT THE REGIONAL LEVEL, Rhode Island Univ., Kingston. For primary bibliographic entry see Field 6E.

SOLID WASTE DISPOSAL AND OCEAN DUMP-ING, Naval War Coll., Newport, R.I. For primary bibliographic entry see Field 5B. W75-06789

COASTAL ZONE PLANNING: THE IMPACT OF REGIONAL EFFORTS IN NEW ENGLAND, Woods Hole Oceanographic Institution, Mass. For primary bibliographic entry see Field 6F. W75-06790

A REVIEW OF THE PRESENT AND AN-NOUNCED FUTURE CAPABILITIES FOR COMMERCIAL OIL RECOVERY BEYOND THE 656 FOOT ISOBATH, State Univ. of New York, Stony Brook. Marine Sciences Research Center. For primary bibliographic entry see Field 5G. W75-06791

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

ECONOMIC INCENTIVES FOR SALINITY REDUCTION AND WATER CONSERVATION IN THE COLORADO RIVER BASIN, Colorado Univ., Boulder. Dept. of Econom For primary bibliographic entry see Field 3C. W75-06373

COST SHARING AND EFFICIENCY IN SALINI-TY CONTROL, National Bureau of Standards, Washington, D.C. **Building Economics Section.** For primary bibliographic entry see Field 3C.

RESEARCH ON WATER RESOURCES EVALUATION METHODOLOGY, A RIVER BASIN ECONOMIC AND FINANCIAL POST-AUDIT Little (Arthur D.), Inc., Cambridge, Mass.

For primary bibliographic entry see Field 6B. W75-06524

W75-06374

WATER AND SEWER SYSTEMS PROGRAM AND DEVELOPMENT, FIVE-YEAR CAPITAL IMPROVEMENT PLAN: OCTOBER 1, 1972 -SEPTEMBER 30, 1977, Jacksonville Dept. of Public Works, Fla.

For primary bibliographic entry see Field 5D.

REVIEW OF THE PRESENT AND AN-NOUNCED FUTURE CAPABILITIES FOR COMMERCIAL OIL RECOVERY BEYOND THE 656 FOOT ISOBATH, State Univ. of New York, Stony Brook. Marine

Sciences Research Center.
For primary bibliographic entry see Field 5G.

6D. Water Demand

CONTROL COMMUNITY IN PLANNING, California Univ., Berkeley. Dept. of Landscape Architecture. For primary bibliographic entry see Field 6B. W75-06429

LONG-RANGE WATER SUPPLY PROBLEMS.

Kansas Water Resources Board, Topeka. Kansas State Water Plan Studies, October 1974. 107 p, 39 fig, 19 tab, 49 ref.

Descriptors: *Kansas, *Water supply, Flood control, Irrigation, Water quality, Water resources, Recreation, Municipal water, Industrial water, Minerals, Agriculture, Land resources, Groundwater, Economics, Water management(Applied), *Water demand, Planning, *Long-term planning. Identifiers: Water plan studies, Long-range problems

Kansas has extensive water, mineral, and land resources which can be utilized to provide economic opportunities. However, in many sections of the state it has become increasingly ap-parent that an adequate quantity of fresh water is not an inexhaustable resource. The gross water used in 1965 was 3.3 million acre-feet. Of this quantity, agriculture used 2.35 million acre-feet while industry and people used the remaining 0.95 million acre-feet. By the beginning of the 21st century, the gross water requirement for agriculture was expected to be 10.9 million acre-feet while people and industry were expected to account for 1.5 million acre-feet. The fact that irrigation development in the western third of the state was pumping groundwater out of some areas faster than it was being replaced by natural recharge was discussed. A significant number of counties in western Kansas were expected to face major depletion of groundwater supplies before the 21st century. The future water supply situation for Kansas was shown graphically in several figures Nainsa was snown graphicary in several rightes which illustrated the total projected demands, the present and potential available groundwater in storage, and the potential undeveloped surface water yields. (Roberts-ISWS)
W75-06473

UNIQUE WATER SUPPLY PROBLEMS IN THE NORTH WEST OF SOUTH AUSTRALIA South Australian Dept. of Health, Adelaide

O. Fuller, and R. Shepherd.

Water (Journal of the Australian Water and Wastewater Association) Vol 1, No 4, p 19-20,22, December 1974. 2 tab.

Descriptors: *Australia, *Water demand, *Water supply, *Arid lands, Water requirements, Dependable supply, Groundwater availability, Groundwater resources, Exploration, Water Identifiers: South Australia. Aboriginal reserves.

The North West Area of South Australia includes an Aboriginal Reserve of some 33,000 square miles, on which are located five settlements with a

combined population of nearly 1,200. Recent developments in administration of such settlements, and in particular an influx of funds from governments, are expected to result in extensive building schemes, with attendant demands for reticulated water supplies and waste disposal systems. Rainfall in the area is low and erratic, rface water supplies are not reliable, and such data as are presently available indicate that safe yield from underground basins is limited. In-vestigations currently under way at each settle-ment are described. (Levick-CSIRO) REGIONAL WATER SUPPLY AUTHORITIES (AS AMENDED).

Florida Sess. Laws, Vol 2, Ch. 74-114, p 242-246, approved May 31, 1974, effective October 1, 1974 (1974).

Descriptors: *Water demand, *Legislation, *Florida, *Water supply development, development, *Administration, Economics, Dependable supply, Social aspects, Water supply, Water utilization, Water policy, Water law, Water quality, Water districts, Regional development, Planning, Water resources development, Comprehensive planning, Urbanization, Governmental interrelations. Identifiers: Environmental policy, State policy.

This Act is concerned with water management districts and regional water supply authorities in Florida. The legislature has determined that cooperative efforts between municipalities, counties, water management districts and the Department of Natural Resources are mandatory in order to meet the water needs of rapidly urbanizing areas. Municipalities and counties are encouraged to create regional water supply authorities. Basin boards are authorized to plan and provide for water supply and transmission facilities to assist regional water supply authorities. The Department shall be responsible for the administration of this Act. Regional water supply authorities may be created by interlocal agreement. The Act sets forth the powers, duties, and responsibilities of these authorities. The Act shall take effect October 1. 1974, and if any provision of the Act or its application is held invalid, the remainder of the Act shall not be affected. (Sperling-Florida) W75-06587

WATER: SUPPLY, DEMAND AND THE LAW Resources for the Future, Inc., Washington, D.C.

Rocky Mountain Law Review, Vol 32, p 452-454,

Descriptors: *Water allocation(Policy), *Water demand, *Water supply, *Water sources, *Water law, Water yield, Desalination, Water quality control, Population, Social aspects, Economics, Costs, Legal aspects, Water resources development, Water supply development, Competing uses, Administration, Water policy, Planning, Water utilization, Future planning(Projected), Constraints, Institutional constraints. Identifiers: Environmental policy.

An overview is presented of the water supply and demand outlook for the United States. The implications of this outlook are considered with respect to policies governing the allocation of water among competing uses. The concentration of demand in relatively limited geographic areas will be responsible for major water supply difficulties. Discussed is the progress being made in research concerning desalinization and weather modification, and the suitability of such processes as water supply sources. It is predicted that in the future the economic growth of the West will be identified less with irrigation and more with the use of available supplies for municipal, industrial, and recreational purposes. The most arresting feature of the water supply-demand outlook is the rapid increase in water use for recreation purposes and a growing recognition of the importance of preserving the aesthetic characteristics of water resources. Although water costs may rise, water supplies are more than ample to meet demand for some time to come, provided that technological advances in the management and use of water are applied. Specific recommendations regarding the modernization of water allocation law are included. (Sperling-Florida)

6E. Water Law and Institutions

LAND-USE ISSUES: PROCEEDINGS OF A CON-FERENCE

Virginia Polytechnic Inst. and State Univ., Blacksburg. Water Resources Research Center. For primary bibliographic entry see Field 4A. W75-06359

SALINITY IN WATER RESOURCES. For primary bibliographic entry see Field 3C. W75-06366

POLICY AND RESEARCH IMPLICATIONS OF THE NATIONAL WATER COMMISSION'S RECOMMENDATIONS,

Wisconsin Univ., Madison. Dept. of Agricultural Economics.

D. W. Bromley, W. R. Butcher, and S. C. Smith. Land Economics, Vol L, No 1, p 15-34, February 1974. 2 tab. OWRR B-057-WIS(5).

Descriptors: *Federal government, *National Water Commission, *Planning, *Water management, *Water rights, Water resources, Water resources development, Conservation, Environmental control.

Identifiers: Water Resource Information System

A National Water Commission was created in 1968 to analyze the nation's water problems and needs, and to generate water policy. In a report published in June 1973, emphasis centered on ways to improve utilization, allocation and management of existing water supplies without Cassandra-like projections regarding future water requirements. Institutional reform coupled with public participa-tion would provide solutions to the nation's water problems. Initially, the Water Resource Council should move to the Executive Office of the President to improve land use and river basin planning and to determine planning grants for states. Through a series of policy changes such as local government financing and support of transferability of water rights, water management would be enhanced. With some emphasis on conservation policies, the report reflects a utilitarian point of view and middle of the road position recommending water quality standards for receiving waters only and suggesting that the quality of the environ-ment is not an absolute to be protected at any cost. Recommendations include recreation uses and pollution control measures. Report does not address goals and objectives of water policies, but it does approve of multiple objective planning calling for price incentives, and underlines the caning for price incentives, and underlines the need for water management to meet economic de-mands and environmental criteria. Besides setting guidelines for management (although failing to ar-ticulate an overall flow management framework), and a Water Resources Information System, the Commission offers at least 8 specific recom dations for the implementation of public participa-tion in the planning and evaluation process. A broad concept of water resource management with a logically consistent institutional structure is needed. (Salzman-North Carolina) W75-06404

SURFACE WATER QUALITY IN MINNESOTA: THE TRANSLATION OF GOALS AND POLI-CIES INTO RESULTS, Minnesota Univ., St. Paul. Water Resources

Research Center.
For primary bibliographic entry see Field 5G.
W75-06431

CHARACTERISTICS OF WYOMING STOCK-WATER PONDS AND DIKE SPREADER SYSTEMS, Wyoming Univ., Laramie. Water Resources

Research Inst., Laramie. Water Reso Research Inst. For primary bibliographic entry see Field 4A. W75-06433

RESERVATION, RESERVOIR AND SELF-DETERMINATION: A CASE STUDY OF RESERVOIR PLANNING AS IT AFFECTS AN INDIAN RESERVATION, Mississippi State Univ., Mississippi State. Dept. of

Anthropology.

For primary bibliographic entry see Field 6B.

THE EFFECTS OF DIMINISHED GROUND-WATER SUPPLIES ON SELECTED NEW HAMPSHIRE INDUSTRIES: AN ECONOMIC AND LEGAL EVALUATION, New Hampshire Univ., Durham. Water Resource

Research Center. For primary bibliographic entry see Field 4B. W75-06463

INTERNATIONAL HYDROLOGICAL DECADE REPRESENTATIVE AND EXPERIMENTAL BASINS IN THE UNITED STATES: CATALOG OF AVAILABLE DATA AND RESULTS, 1965-

National Committee for the International Hydrological Decade, Washington, D.C. For primary bibliographic entry see Field 2A. W75-06472

GREAT LAKES WATER QUALITY, ANNUAL REPORT TO THE INTERNATIONAL JOINT COMMISSION, (1973).

International Joint Commission-United States and Canada. Great Lakes Water Quality Board For primary bibliographic entry see Field 5B. W75-06474

WATER QUALITY STANDARDS AND INTER-NATIONAL DEVELOPMENT.

Agency for International Development, Washington, D.C. Office of Science and Technolog For primary bibliographic entry see Field 5G. W75-06487

ROLE OF THE SCIENTIST TECHNICIAN IN WATER POLICY DECISIONS AT THE COMMUNITY LEVEL: A STUDY IN PURPOSIVE COMMUNICATION, Minnesota Univ., St. Paul. Dept. of Rural Sociolo-

gy. R. E. Rickson, P. J. Tichenor, G. A. Donohue, and

Available from the National Technical Information stron Service, Springfield, Va 22161 as PB-241 122, \$4.25 in paper copy, \$2.25 in microfiche. Minnesota, Water Resources Research Center, St. Paul, Bulletin Number 79, January 1975. 51 p, 14 tab, 6 ref., append. OWRT B-067-Minn(2). 14-31-0001 2001

Descriptors: *Community development. *Attitudes, Sociology, *Water policy, *Decision making, Communication, Information exchange, Scientific personnel.

Identifiers: *Scientific applications.

The objective is to increase understanding of how scientific knowledge may be most effectively ap-plied to community problem-solving. The report focuses on: how certain community characteristics affect public perspective of science and the role of the scientist in solving water resource problems; and the degree of consensus between perspectives and local leaders about science and the role of the scientist in defining and solving water problems. (Waelti-Minnesota) W75-06519

THE UNCERTAIN SEARCH FOR ENVIRON-MENTAL QUALITY,

Yale Univ., New Haven, Conn. School of Law. For primary bibliographic entry see Field 5G.

Field 6-WATER RESOURCES PLANNING

Group 6E-Water Law and Institutions

ADMINISTRATION OF GROUND WATER AS BOTH A RENEWABLE AND NONRENEWABLE RESOURCE,

Idaho Bureau of Mines and Geology, Moscow. For primary bibliographic entry see Field 4B. W75-06570

MISSISSIPPI COASTAL ZONE MANAGEMENT APPLICATION 1974. Mississippi Marine Resources Council, Long

Beach.

1974. 146 p, 6 fig, 1 tab, 3 append.

Descriptors: *Planning, *Mississippi, *Federal government, *State governments, *Grants, Administrative agencies, Governmental interrelations, Budgeting, Water resources development, Water policy, Water law, Financing, Government finance, Shores, Zoning, Land management, Land use, Water utilization, Coasts, Coastal marshes, Coastal plains, Estuaries, Gulf coastal plain, Bayous, Comprehensive planning, Federal government, Cost sharing.

Identifiers: *Coastal zone management, Coastal waters, Environmental policy.

The revised application of the Mississippi Marine Resources Council requesting federal assistance for its statewide Coastal Zone Management Development Program was submitted to the Office of Coastal Environment of the Department of Commerce. It conforms to the final regulations and procedures set forth in the federal guidelines of November 29, 1973. The program is designed to be consistent with the requirements of the Coastal Zone Management Act of 1972 and involves the development of a statement setting forth objectives, policies, and standards to guide the use of lands and waters in the coastal zone. The cost of this first year effort is estimated to be \$152,346 for which a grant of \$101,564 is being requested. Included is a summary of the state's past coastal zone management activities as well as the specific activities and goals of the proposed program. (Deckert-Florida)

WATER REGULATIONS--TOXIC POLLUTANT EFFLUENT STANDARDS.
For primary bibliographic entry see Field 5G. W75-06576

UNITED STATES V. 295.90 ACRES OF LAND, MORE OR LESS, IN THE COUNTY OF LEE, STATE OF FLORIDA, AND CARL A. NORBERG, ET AL. (ACTION ON EMINENT DOMAIN PROCEEDING).
368 F. Supp. 1301 (M.D. Fla. 1974).

Descriptors: *Accretion, *Bodies of water, *Florida, *Judicial decisions, *Meanders, Land tenure, Surveys, Mapping, Riparian rights, Water law, Legal aspects, Eminent domain, Condemnation.

Identifiers: *Wilderness areas

An eminent domain proceeding was instituted by the United States to acquire certain lands on Sanibel Island for use as part of a national wildlife refuge. The Government contended that it already owned a major portion of the subject lands prior to the institution of the suit due to an error in the original survey. The general rule is that when lands are patented according to an official survey showing meander lines along a body of water any excess land outside the meander line is apportioned to the patentee and his title is extended to the water's edge in accord with the intent of the surveyor. Where, however, the meander line is shown to be grossly erroneous and tantamount to fraud, then any land beyond the meander line is to be treated as unsurveyed land, with title remaining in the government. The court held that despite the fact that no water bottom existed in the area indicated, it was enough that some water bottom ex-

isted in the section to preclude a finding of gross and palpable error tantamount to fraud. (Proctor-Florida) W75-06577

COUNTY WATER MANAGEMENT--JURISDIC-TION (AS AMENDED). Minnesota Sess. Laws, Vol 4, Ch. 392, S.F. No.

2822, p 631-632, approved April 5, 1974 (1974).

Descriptors: *Minnesota, *Legislation, *Local governments, *Jurisdiction, *Water utilization, Water law, Governments, State governments Governments, Regulation, Administration, Suburban areas, Legal aspects, Zoning, Control, Water policy, Bodies of water, Water resources development, Planning, Surface waters, Water rights, Inter-agency cooperation. Identifiers: Water rights(Non-riparians), State policy

Certain provisions of the Minnesota Statutes are hereby amended in order to clarify the jurisdiction of counties and lake conservation districts over certain bodies of water. Minnesota Statutes, 1973 Supplement, Section 378.31, is amended to provide that every county board shall have the power set forth in that section with respect to waters situated wholly or partly within the county and not situated entirely within any city, village, borough, or lake conservation district. All programs undertaken pursuant to such powers shall be consistent with statewide and/or regional water and related land resources plans. No body of water shall be improved under this section unless public access is provided to the shoreline thereof. County boards may regulate the surface use of waters within this jurisdiction, except that where a body of water lies in more than one county, such regulation must be approved by all the county boards having jurisdiction over that body of water or placed into effect by order of the commissioner of natural resources. Where a body of water ics partially within a city, village, or borough, further restrictions are established to assure compatibility between state, county, and local surface use regulations. (Deckert-Florida)

WATER REGULATIONS--PRETREATMENT STANDARDS.

For primary bibliographic entry see Field 5G. W75-06579

ENVIRONMENTAL DEFENSE FUND V. TENNESSEE VALLEY AUTHORITY. 371 F. Supp. 1004 (E.D. Tenn. 1973).

Descriptors: *Dam construction, *Judicial decisions, Legislation, Construction, Project planning, Benefits, Water quality control, Recreation, Agriculture, Project purposes, *Tennessee Valley Authority, Optimum development plans, Water resources development, Tennessee. Identifiers: *Environmental Impact Statements,

*National Environmental Impact Statements,
*National Environmental Policy Act, Injunctive relief, Tellico Dam project(Tenn).

Suit was brought to enjoin the Tennessee Valley Authority (TVA) from completing the construction of the Tellico Dam Project. The Tellico Project is a multi-purpose water resource and regional development plan which contemplates the inundation of acreage upon completion of the reservoir. This acreage consists of agricultural land, recreational areas, and important historical and archaeological landmarks. The project was subject to the National Environmental Policy Act (NEPA), which requires the inclusion of an environmental impact statement relating to any federal action significantly affecting the quality of the human environment. Plaintiffs attacked the sufficiency of the statement's discussion of various areas, including historical and archaeological impact, family relocation, and ecological effect.

The court held that TVA had compiled with NEPA in issuing a statement which disclosed the significant impacts to result from the project and discussed the reasonable alternatives available. Moreover, the court found that TVA reached its decision through a good faith consideration and balancing of environmental factors. (Proctor-Florida)
W75-06580

STATE OF WISCONSIN V. CALLAWAY (ACTION FOR INJUNCTIVE RELIEF ON DREDGING ACTIVITIES ON MISSISSIPPI RIVER).

371 F. Supp. 807 (W.D. Wis. 1974).

Descriptors: *Dredging, *Landfills, *Channel improvement, Legal aspects, Channel erosion, Rivers, Channels, *Wisconsin, *Mississippi River. Identifiers: *Environmental Impact Statements, *Administrative regulations, Injunctive relief.

An action was brought by the State of Wisconsin in the District Court for injunctive relief with respect to dredging activities in that part of the Mississippi River which forms a boundary of the State of Wisconsin. As an aid to navigation in the upper Mississippi River, the defendant Army Corps of Engineers operated and maintained a system of locks and dams with a nine-foot channel. The channel was maintained at a depth of nine feet by the defendants through a yearly dredging program which resulted in the deposit of the spoil on lands near the dredging site. The court held that the dredging process significantly affected the environment requiring the preparation of an environmental impact statement. The court enjoined continued dredging until submission of the environmental impact statement, with a proviso for a petition for modification of the injunction in emergency situations. (Proctor-Florida) W75-06581

STATE EX REL. DEPARTMENT OF HEALTH V. NORTH JERSEY DISTRICT WATER SUPPLY COMMISSION (ACTION SEEKING MANDATORY INJUNCTION ON REQUIRING COMPLIANCE WITH ORDER TO IMPROVE, ADD TO, OR ALTER WATER TREATMENT PLANT).

PLANT). 317 A.2d 86 (N.J. Ct. App. 1974).

Descriptors: *Water supply development, *Public health, *Water treatment, *Filtration, Treatment facilities, Treatment, Bond issues, Water districts, Water resources, Conservation, Reservoirs, Capital costs, *New Jersey, Water supply, Water management, Water quality.

Identifiers: Injunctive relief, Inverse condemna-

tion, State policy.

An injunction was issued requiring the North Jersey Water Supply District to effect immediate compliance with a State Department of Health order requiring the District to improve the water treatment plant located at a particular reservoir. Two participating communities in the District, Passaic Valley and Newark, appealed from that portion of the order requiring them to participate in the proposed filtration construction and to contribute a proportionate share of its cost, alleging that the order was unreasonable. The court reasoned that the State's overriding concern and obligation is to safeguard the public health and that water supplies should be pure in quality and economically and prudently managed for the benefit of the public. As a necessary adjunct, an implied power resides in the District not only to repair and maintain existing facilities, but also to construct additional facilities at the joint expense of the participating municipalities. The court held that such action did not constitute inverse condemnation of Passaic Valley's soon to be abandoned filtration plant, and that exercise of the State's police power does not give rise to a right of compensation, even though the value of the pro-

perty may consequently be reduced. The court also recognized an implied state power to issue bonds to finance construction of such facilities. Gagliardi-Florida) W75-06582

STATE LAND USE PLANNING.

Acts of Kentucky General Assembly, H.B. 462, Approved March 28, 1974, effective June 21, 1974, p 327-329 (1974).

Descriptors: *Land use, *Kentucky, *Legislation, *Water management(Applied), *Water quality, *Water utilization, Water resources, Planning, Public health, Safety, Water policy, Water resources development, Federal government, Coordination, Administrative agencies, Decision making, Adoption of practices, Land management, Comprehensive planning, Governmental interelations. terrelations Identifiers: Administrative regulations

To insure a water management system that will prevent the deterioration of water quality and provide optimum utilization of water resources, it is necessary that growth in Kentucky be guided and planned. If this is not done the public health, safety, and quality of life of the population will be ngered. Land and water management policies need to be established to guide and coordinate state, interstate and local decisions relating to growth and development. The state land and water grown and development. The state land and water management policies should be implemented by local governments. All existing rights of private property must be preserved. A Land Use Planning Council will compile data and review literature necessary for decision making concerning land use and resource management, and make such data available to the public. It will also devise various means for the establishment of coordination and communication among federal, state, and local agencies. (Sperling-Florida) W75-06583

ENVIRONMENTAL LAW-PUBLIC TRUST--IN-JURY TO PUBLIC TRUST IS BASIS FOR AWARD OF DAMAGES, For primary bibliographic entry see Field 5G. W75-06584

ENVIRONMENTAL LAW--JUDICIAL REVIEW UNDER NEPA, For primary bibliographic entry see Field 5G. W75-06585

GROUNDWATER POLLUTION: CASE LAW THEORIES FOR RELIEF, Missouri Univ., Columbia For primary bibliographic entry see Field 5B. W75-06589

FEDERAL WATER POLLUTION CONTROL STATUTES IN THEORY AND PRACTICE, Illinois Univ., Chicago. For primary bibliographic entry see Field 5G. W75-06590

CALIFORNIA SURFACE WATER LAW For primary bibliographic entry see Field 4A. W75-06591

PRESERVATION OF WETLANDS: THE CASE OF SAN FRANCISCO BAY, Environmental Protection Agency, Washington, D.C. Office of Water Programs. For primary bibliographic entry see Field 4A. W75-06592

HANDLING OF AIR AND WATER POLLUTION CASES BY THE PLAINTIFF, For primary bibliographic entry see Field 5G.

W75-06593

WATER: SUPPLY, DEMAND AND THE LAW Resources for the Future, Inc., Washington, D.C. For primary bibliographic entry see Field 6D.

NEW WATER LAW PROBLEMS AND OLD PUBLIC LAW PRINCIPLES, New Mexico Univ., Albuquerque. Rocky Mountain Law Review, Vol 32, p 437-451, 1960, 61 ref.

Descriptors: *Water law, *Legislation, *Judicial decisions, *Water pollution, *Water quality control, Groundwater, Management, Runoff, Flood plains, Oklahoma, Arizona, Utah, Flood control. Regulation, Overflow, Water resources developent. Cities.

The modern era has added complicating factors to the age-old community problem of an adequate and potable water supply. Goals such as improved development allocation, and distribution of water supplies, flood plain development, and pollution controls have been established. Recent legislative changes in water law display a concern for the public interest, recognition of the useful role that scientific methods and technical data must play in water resources policy and management, and a general awareness of changing community preferences with respect to actual uses. Decisions construing this legislation focus on the public na-ture of water problems. Court decisions in various western states have dealt with legislation as it applies to ground water management and balancing the varigated land-water interests among individuals, communities and states. The unifying community characteristic of the West is anxiety over water resources, their scarcity and their destructive excesses. The dominant water law institutions of the West have been greatly modified through piecemeal legislation which has recognized the inherent limitation of private litigation to protect water rights. The West is a pioneer in the anticipation through law and administrative procedures of the water resources future of the Nation. (Sperling-Florida) W75-06595

RED TIDE RESEARCH.

Florida Sess Laws, Vol 3, Ch 74-123, p 294-295, approved June 9, 1974, effective July 1, 1974 (1974).

Descriptors: *Red tide, *Water pollution sources, *Legislation, *Florida, Aquatic life, Marine biology, Mortality, Public health, Water law, Water pollution, Fish toxins, Marine algae, Marine animals, Marine plants, Aquatic environment, Aquatic microbiology, Fish kill.

An ad hoc council within the Florida Department of Natural Resources is created for red tide research. It shall consist of three to seven members comprised of representatives of the Department of Natural Resources and the Department of Health and Rehabilitation Services. These members may appoint not more than four additional members to serve at their pleasure. The Council will evaluate and coordinate all the red tide research activities within the State of Florida and report annually to the Legislature on its activities during the preceeding year. (Sperling-Florida)

BEACH EROSION CONTROL-TRUST FUND

ACCOUNT. Florida Sess Laws, Vol 2, Ch 74-102, p 165-168, approved May 30, 1974, effective July 1, 1974 (1974).

Descriptors: *Legislation, *Florida, *Beach ero-*Weathering, Waves(Water), Storms, Running waters, Impact(Rainfall), Erosion rates, Wind erosion, Financing, Economics, Budgeting, Capital, Costs, Financial feasibility, Water law. Identifiers: Erosion control accounts

The Florida Department of Natural Resources is authorized to pay up to 75% of non-federal construction and miantenance costs of specified beach erosion control projects. The use of funds for beach restoration where there is no public access is prohibited. For an area to qualify for state funding, local interests must provide permanent public access to project areas. The Department is authorized to expend funds from the erosion control trust fund account in order to alleviate emergency conditions related to shoreline stability. Expenses for other erosion controls, beach preservation, and hurricane protection are provided. The Department is also authorized to initiate, construct, and pay the entire costs of projects which involve shoreline whose upland owner is the State of Florida. (Sperling-Florida) W75-06597

BISCAYNE BAY-AQUATIC PRESERVE. Florida Sess Laws, Vol 3, Ch 74-171, p 364-366, approved June 11, 1974, effective--same date

Descriptors: *Legislation, *Florida, Bays, Riparian rights, Legal aspects, Water law, Competing uses, Water pollution, Water rights, Water quality control, Water resources development, Water policy, Water management(Applied), Water allocation(Policy), State governments, Waste water(Pollution), Waste water disposal, Waste water treatment.

Identifiers: *Environmental policy, *Biscayne Bay(Fla).

Biscayne Bay in Dade and Monroe Counties, Florida is established as an aquatic preserve. The preserve will operate within the scope of the powers, duties, and responsibilities of the Trustees of the Internal Improvement Trust Fund. Restrictions are imposed on the sale and use of lands and waters in the preserve. The riparian rights of upland owners within or adjacent to the preserve are delineated. Wastes and effluents are prohibited from being discharged into the preserve to the extent that such discharges substantially interfere with the purpose of the legislation. Bulkhead lines are also to be relocated to enhance the preserve. The enactment further provides for enforcement, application of existing law, severability and an effective date. (Sperling-Florida) W75-06598

WATER REGULATIONS--AREAWIDE WASTE TREATMENT MANAGEMENT PLANNING AREAS AND RESPONSIBLE PLANNING AGEN-CIES.

For primary bibliographic entry see Field 5G. W75-06599

REGULATIONS--OIL POLLUTION PREVENTION. For primary bibliographic entry see Field 5G. W75-06600

REGULATIONS--POLICIES PROCEDURES FOR STATE CONTINUING PLANNING PROCESS. For primary bibliographic entry see Field 5G.

ADOPTED STANDARDS (WATER QUALITY). For primary bibliographic entry see Field 5G. W75-06602

Field 6-WATER RESOURCES PLANNING

Group 6E-Water Law and Institutions

WHITE BEAR LAKE CONSERVATION DIS-TRICT (AS AMENDED). Minnesota Sess Laws, Vol 2, Ch 111, H.F. No

2703, p 151-152, approved March 13, 1974 (1974).

Descriptors: *Minnesota, *Legislation, *Regulation, *Lakes, *Water conservation, Administration, Administrative agencies, State governments, Inter-agency cooperation, Local governments, Lake shores, Land use, Water governments, Lake snores, Land use, water resources development, Water quality control, Law enforcement, Legal aspects, Water law, Water policy, Boating regulations, Management, Non-structure alternatives, Water rights, Water utilization, Adoption of practices.
Identifiers: Public trust doctrine, Environment

policy, Water rights(Non-riparians), State policy, White Bear Lake(Minn).

The White Bear conservation district is granted specific regulatory powers with respect to the use of boats and motors on the lake, the maintenance and policing of public facilities for access to the lake, the construction and maintenance of permanent and temporary docks and moorings, the construction and use of mechanical and chemical means of de-icing the lake and removing weeds and algae, the construction and maintenance of commercial marinas, and any other construction or lakeshore use on any land abutting the shoreline of the lake. The district also has the power to contract with other governmental bodies or agencies to perform any of the functions of the district, to receive financial assistance from other govern-mental agencies, and to petition without bond any watershed district within which the lake conservation district may be situated for improvements. The expenses of the district shall be borne by the municipalities in proportion to the assessed value of each municipality. (Deckert-Florida) W75-06603

HJELLE V. BROOKS (ACTION TO ENJOIN EN-FORCEMENT OF ALASKAN REGULATION OF CRAB FISHING IN THE BERING SEA SHELLF-ISH AREA).

377 F. Supp. 430 (D. Alaska 1974).

Descriptors: *Alaska, *Judicial decisions, *State principiors: "Alaska, "Judicial decisions, "State jurisdiction, "Commercial fishing, "Constitutional law, Commercial shellfish, Crabs, Administrative agencies, Federal jurisdiction, Legal aspects, Water rights, Water law, Federal-state water rights conflicts, Regulation, Oceans, International law, Jurisdiction, International waters, Control, Fig. 1, 2018. Fish conservation, Resources, Fish harvest, Law enforcement, State governments.

ldentifiers: Injunctive relief, Territorial seas/Jurisdiction), Administrative regulations, Coastal waters, Contiguous zone, Water rights(Non-riparians), Standing(Legal), Declarato-

ry judgments

Plaintiff Washington crab fishermen brought suit seeking declaratory and injunctive relief before a three-judge district court in Alaska. The plaintiffs immediately sought a preliminary injunction bar-ring the defendant, an Alaskan state agency, from enforcing certain regulation pertaining to crab fishing in the Bering Sea. The plaintiffs contended that the defendant's attempt to regulate crab fishing in waters outside the territorial waters of Alaska violated the due process and commerce clauses of the federal constitution. The defendants argued that the court lacked jurisdiction, that the plaintiffs had adequate recourse through the state courts and the federal court should therfore abstain, that the state may unilaterally extend its maritime boundaries to the territorial limits so long as it does not conflict with federal or international law, and that the state regulations may be applied extraterritorially if necessary to protect state in-terests. The court held that it had jurisdiction and, finding that the plaintiffs showed a reasonable likelihood of succeeding and would suffer con-siderable harm if the injunction was not issued, granted the preliminary injunction. (Deckert-Florida)

W75-06604

GRAND CANYON DORRIES, INC. V. WALKER (SEEKING DECLARATORY INJUNCTIVE RE-LIEF CONCERNING DISCHARGES OF WATER FROM DAM).

500 F. 2d 588 (10th Cir. 1974).

Descriptors: *Judicial decisions, United States, Descriptors: Juncial decisions, United States, *Colorado River, *Streamflow, *Dams, Economic aspects, Federal government, Water demand, Reservoir operation, Legal aspects, Administrative agencies, Adoption of practices, Safety, Administration, Decision making, Utah, Water distribution(Applied), Water allocation(Policy), Reservoir releases, Administrative decisions, Adjudication procedure, Regulation. Identifiers: Injunctive relief, NEPA, Environmen-

tal impact statement, Licenses, Declaratory judgments, Navigation obstructions.

On appeal before the United States Court of Appeals for the Tenth Circuit the operators of commercial float trips on the Colorado River below the Glen Canyon dam sought to enjoin the director of the National Park Service from intermittently reducing the flow of water from the dam and thereby impairing the safe conduct of appellants' trips. The District Court in Utah had denied relief and that judgment was affirmed on appeal. The Circuit Court held that even if contractual obligations arose from the appellants' concession licenses, injunctive relief was not available in a contract action. The Court also found that the application of the National Environmental Policy Act to the ongoing operation of a dam was not ripe for a judicial determination in the absence of an administrative determination of the matter. (Sperling-Florida) W75-06605

POWER AUTHORITY OF STATE OF NEW YORK V. DEPT. OF ENVIRONMENTAL CON-YORK V. DEPT. OF ENVIRONMENTAL CON-SERVATION OF STATE OF NEW YORK (SEEKING DECLARATORY AND INJUNCTIVE RELIEF AS TO WHETHER DEPARTMENT WAS WITHOUT AUTHORITY IN ISSUING CERTIFICATE FOR POWERPLANT WATER DISCHARGE).

379 F. Supp. 243 (N.D. N.Y. 1974).

Descriptors: *New York *Judicial decisions, *Legal aspects, *Electric power production, *Waste water disposal, Regulation, United States, Jurisdiction, Administrative agencies, Administration, Decision making, Adoption of practices, Standards, Legislation, Water policy, Water law, Electric power plants, Thermal pollution, Adjudication procedure, Administrative decisions Identifiers: Notice, Injunctive relief, Declaratory relief, FWPCA Amendments of 1972

Action was brought in a United States district court in New York by the Power Authority of the State of New York against the New York Department of Environmental Conservation. The Power Authority sought mandatory, injunctive, and declaratory relief to restrain the Department from holding hearings on the Authority's certification for water discharge from a proposed powerplant. The court held that it lacked jurisdiction since the issuance of notice for hearing and a single day of hearings was insufficient administrative action for jurisdiction to attach. None-the-less, the Department has the authority under the Federal Water Pollution Control Act to hold hearings on the tification of Water discharges to determine if these discharges comply with various sections of the 1972 Amendments to the Federal Water Pollution Control Act. (Sperling-Florida)

U.S. V. W.B. ENTERPRISES, INC. (SUIT TO RECOVER CIVIL PENALTY ASSESSED FOR LEAKAGE OF OIL FROM BARGE). 378 F. Supp. 420 (S.D. New York 1974). Descriptors: *Judicial decisions, *Oil spills, *Legal aspects, *Federal Water Pollution Control Act, United States, *New York, Water quality control, Rivers, Oil wastes, Water pollution, Water pollution sources, Water pollution effects, Legislation, Waste water discharge, Environmental sanitation, Administration, Oil pollution, Enforcement, Adjudication procedure Identifiers: Hazardous substances(Pollution), Non-point source(Pollution).

Suit was brought by the United States to recover a five hundred dollar civil penalty assessed against a barge owner. The assessment was made by the Coast Guard district commander for the alleged violation of the Federal Water Pollution Control Act by leakage of some twenty-five to thirty gal-lons of oil into the East River. The Southern District Court of New York held that since the Coast Guard is charged with execution of the statute, great weight must be given to its interpretation of the statute. The provision in the Act proscribing discharge of oil and hazardous substances is aimed at preventing any discharges, and not just those charges which are not removed. In this case, since the discharge created a sheen or discolora-tion of the water's surface, the defendant violated the Act, and the imposition of a civil penalty was not limited only to compensatory damages. (Sperling-Florida) W75-06607

WARM SPRINGS DAM TASK FORCE V. GRIB-MARM STRINUS DAM TASK FURCE V. GRIB-BLE (SEEKING INJUNCTION TO DELAY AWARDING CONTRACT FOR CONSTRUC-TION OF MAJOR SECTION OF PROPOSED DAM AND RESERVOIR PROJECT), 378 F. Supp. 240 (N.D. Cal. 1974).

Descriptors: *California, *Federal government, *Judicial decisions, *Construction, *Dams, Reservoirs, Legal aspects, Environmental effects, Contract Administration, Adoption of practices, Planning, Administrative agencies, Conservation, Water resources development, Decision making, Administrative decisions, Adjudication procedure, Equity, Preservation.
Identifiers: Injunctive relief, Environmental Im-

pact Statements, National Environmental Policy

Suit was brought in the Northern District of California by an unincorporated association against Corps of Engineers of the United States Army. The suit seeks a preliminary injunction to delay the award of a contract for the construction of a major segment of a proposed dam and reser-voir project until alleged deficiencies in the en-vironmental impact statement were remedied. The court held that the archeological element of the environmental impact statement was not deficient despite obvious shortcomings. The Secretary of Interior's determination that the archaeological district within the area of the proposed project might be eligible for inclusion in the National Re-gister of Historic Places compelled the Corps to reconsider the project. If the Corps proposed to substantially alter the property, it should not act until the Advisory Council on Historical Preservation had an opportunity to comment. However, the Corps was only restricted from disturbing known or suspected sites, not from disturbing any portion at all within the district. (Sperling-Florida) W75-06608

COMMONWEALTH OF PENNSYLVANIA V. BARNES AND TUCKER CO. (ACTION TO REQUIRE OWNER OF CLOSED MINE TO TREAT ACID MINE DRAINAGE DISCHARGING FROM MINE). 319 A 2d 871 (Pa 1974).

Descriptors: *Pennsylvania, *Acid mine water, *Water pollution control, *Regulation, *Judicial decisions, Legislation, Industrial wastes, Waste water treatment, Conservation, Environmental ef-

WATER RESOURCES PLANNING-Field 6

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fects, Permits, Adoption of practices, Streams, Water pollution, Administration, Administrative agencies, State governments, Abatement, Mine water, Water pollution sources, Water quality, Mine drainage, Adjudication procedure.

Identifiers: Nuisance(Legal aspects).

Pennsylvania brought an action to require an owner of a closed mine to treat acid mine drainage discharging from a mine. The Pennsylvania Supreme Court held that the provisions of the an Streams Law relating to discharge permits did not authorize maintenance of an action with respect to a closed mine, but that the discharge constituted a public nuisance which the Commonwealth was entitled to abate as a common law nuisance. In public used of water of a stream, the pollution of the same creates an enjoinable nuisance. The Clean Streams Law of 1965 which extended the coverage and permit provisions by eliminating any distinction between clean and unclean streams did not expressly impose responsibility on the owner of a closed mine to abate or treat postmining discharges. The grant of administrative power to promulgate regulations and to require permit applications to include restoration measures must be viewed in the context of the enabling statutory section. (Sperling-Florida)

ARKANSAS ENVIRONMENTAL QUALITY ACT

Arkansas Stat Ann, Vol 2, Title 9, Ch 14, sections 1401-1416, p 381-385 (Supp 1973).

Descriptors: *Arkansas, *Legislation, governments, *Preservation, *Environmental con-trol, Regulation, Conservation, Administration, Administrative agencies, Water resources troi, Regulation, Conservation, Administration, Administrative agencies, Water resources development, Water law, Legal aspects, Water policy, Management, Protection, Ecology, Habitats, Decision making, Natural resources, Resources, Wildlife conservation, Adoption of practices, Administrative decisions, Scenic easements, Conservation.

Identifiers: Public trust doctrine, Environmental policy, State policy.

A state system of natural areas is herby established. The system shall consist of lands, waters, and interests therein, including environmental and scenic easements, acquired and ad-ministered by the Arkansas Environmental Preservation Commission. The Commission shall consist of nine members, appointed by the Governor to serve staggered nine year terms. General priori-ties, procedures, and restrictions governing the acquisition power of the Commission are set forth in the Act. The Commission shall establish and administer rules and regulations governing the selection, acquisition, management and protection of the system. It shall also maintain a registry of natu-ral areas which shall include all lands and waters, whether publicly or privately owned, of natural or historical significance, and shall maintain an in-ventory of habitats of rare, vanishing, or endangered species of plants and animals. An annual re-port shall be submitted to the Governor and General Assembly, which shall describe and account for the status and condition of each portion of the system and each natural area listed in the registry of natural areas. (Deckert-Florida) W75-06610

PRESERVATION AND DEVELOPMENT OF

COASTAL AREAS. Code of Alabama, Vol 4, Title 8, Ch. 12, secs. 312-320, p. 75-84 (Supp. 1974).

Descriptors: *Alabama, *Legislation, *Coasts, *Regulation, *State governments, Shore protection, Coastal marshes, Administration, Penalties(Legal), Administrative agencies, Inter-agency cooperation, Oceans, Governmental interrelations, Local governments, Gulf Coastal Plain, Estuaries, Shores, Water law, Legal aspects, Legal rview, Water rights, Planning, Water policy, Water resources development, Adoption of prac-

Identifiers: *Coastal waters, *Coastal zone management, Environmental policy, State policy.

There is hereby created the Alabama Coastal Area Board, composed of eight designated officials from various agencies of state and local governments. The Board shall develop and implement a comprehensive coastal area administration program consistent with the national policy expressed in the Coastal Zone Management Act of 1972 and the goals of the state legislature as expressed ein. The Board shall have the authority to control certain 'regulated activities', as defined in the Act, as it deems necessary for the preservation and development of coastal areas. Unless permissible under the administration program to be developed, the following activities may not be conducted without permit of the Board: excavation or dumping of any kind in any coastal areas; killing or materially damaging any flora or fauna in any coastal area; and the creation of any structure affecting the ebb and flow of the tide in any coastal area. Procedures for issuing such permits are set forth in the Act. Decisions of the board concerning the permits are subject to judicial review and criminal and civil sanctions may be imposed for violation of the Act's provisions. (Deckert-Florida) W75-06611

U.S. V. LEWIS (INJUNCTION ACTION BASED ON VIOLATION OF RIVERS AND HARBORS ACT.

355 F. Supp. 1132 (S.D. Ga. 1973).

Descriptors: *Navigable waters, *Judicial decisions, *Road construction, *Marshes, Highway efsions, "Road construction, "Marsnes, Highway effects, Environment, Environmental effects, Roads, Rivers and Harbors Act, Legislation, "Georgia, Permits, Water law, Water resources development, Waste disposal, Sludge disposal, Water quality control, Damages.

Identifiers: *Injunctive relief.

The United States brought suit in the Southern District of Georgia seeking to enjoin construction of a causeway across tidal marsh. The court held the marshlands were navigable waters for purposes of the exercise of federal jurisidiction. In addition the construction of a causeway without a permit from the Army Corps of Engineers was held to violate the 'obstruction' section of the Rivers and Harbors Act, and the unauthorized deposit of refuse matter into navigable water was a violation of 33 U.S.C. Section 407. (Proctor-Florida) W75-06612

U.S. V. STOECO HOMES, INC. (APPEAL FROM INJUNCTION FOR VIOLATIONS OF RIVERS AND HARBORS ACT). 498 F. 2d 597 (3d Cir. 1974).

Descriptors: *New Jersey, *Judicial decisions, *Regulation, *Tidal marshes, *Rivers and Harbors Act, Dredging, Permits, Legislation, Water law, Administrative agencies, Legal aspects, Land tenure, Excavation, Federal jurisdiction, Federal government, Wetlands, Administration, Navigable waters, Legal review, Land development, Land-fills, Land management, Silting, Water pollution sources, Water quality control.

sources, water quanty control.

Identifiers: Navigational servitude, Navigability tests, Fill permits, Administrative regulations, Coastal zone management, Injunctive relief, FWPCA Amendments of 1972, Navigation ob-

The federal government, alleging violations of the Rivers and Harbors Appropriation Act of 1899, sought to permanently enjoin the defendant development corporation from engaging in any further dredge, fill, or construction operations on

its property, without the prior recommendation of the Army Corps of Engineers and approval of the Secretary of the Army. The government alleged that the defendant's operations were resulting in the unauthorized discharge of dredge fill into the adjacent navigable lagoons. It further contended that the entire parcel of property was within the navigable waters of the United States and thus excavation of the lagoons without a permit was in violation of the act. The lower court granted the in-junction and the defendant appealed. The Court of Appeals for the Third Circuit held that the lagoons were navigable waters under the Act, but those portions of the defendant's property which were ove the mean high tide were no longer subject to above the mean high use were no longer subject to the government's navigational servitude. Ac-cordingly, the court sustained the injunction to the extent that it prohibited hydraulic dredging, but re-manded the case for the entry of a modified in-junction in accordance with this opinion. (Deckert-Florida) W75-06613

WATER REGULATIONS-LIABILITY LIMITS FOR SMALL ONSHORE STORAGE FACILI-

For primary bibliographic entry see Field 5G. W75-06614

POINT SOURCES COVERED BY NPDES AND PROCEDURES.

For primary bibliographic entry see Field 5G. W75-06617

POLLUTION-REGULATION. Minnesota Sess. L.AAWS, Vol 4, Ch 483, H.F. No 1662, p 942-947, approved April 11, 1974 (1974).

*Minnesota, control, *Legislation, Descriptors: *Environmental control, *Regulation,
*Administrative agencies, Waste disposal, Water law, Legal aspects, State governments, Administration, Permits, Standards, Air pollution, Pollution abatement, Quality control, Wastes, Solid wastes, Water quality standards. Identifiers: Environmental policy, Administrative

The director of the Minnesota state pollution control agency is hereby authorized to appoint a deputy director and an assistant director. The director may designate the depty director to act in his stead as a member of any agency, board, committee or commission that the director is made a member of by law. The statutory meaning of 'solid waste' is expanded to include garbage, refuse, and other discharded solid materials, including solids and sludges resulting from industrial, commercial and agricultural operations, and from community activities, but does not include animal waste used as fertilizer, earthenfill, rocks, or certain types of common water pollutants. The pollution control agency is directed to establish air quality and noise pollution standards and is authorized to establish regulations relating to air and noise pollution. The ponution standards and is authorized to establish regulations relating to air and noise pollution. The agency is provided permit authority to govern noise pollution and is granted power to regulate the storage of solid waste. The statutory definition of 'junk yard' is expanded. (Deckert-Florida()

EFFLUENT GUIDELINES ARE ON THE WAY, For primary bibliographic entry see Field 5G. W75-06619

INTERFERENCE WITH THE FLOW OF SUR-FACE WATER,

T. H. Burnett.

Kentucky Law Journal, Vol 50, No 1, p 254-257, 1961. 17 ref.

Descriptors: *Surface waters, *Judicial decisions, *Runoff, *Surface runoff, *Reasonable use,

Field 6-WATER RESOURCES PLANNING

Group 6E-Water Law and Institutions

Water resources, Drainage water, Overland flow, Rain water, Highway, Storm runoff, Landfills Water law, Water resources development, Legal aspects, Adjudication Adjudication Negligence. procedure, ment(Applied). Kentucky, Water

Identifiers: Liability(Legal aspects), rights(Non-riparians), State policy, Common

Plantiff and defendant own land on opposite sides of a highway. The natural surface drainage is northwesterly across plaintiff's land, under an abandoned fill, under the highway, and onto defendant's land. Defendant constructed a fill across a creek on his land six hundred feet northwest of the highway and installed several large drainpipes. During an unprecedented rainfall, water backed up behind defendant's fill and onto plantiff's land, damaging a tenanat's house and other property. The issue was submitted to the jury under instructions based on negligence in the construction of the fill. In affirming judgment for the plaintiff, the court held that the civil law rul of absolute liability for obstruction of surface waters applied. The judicial rule prohibits interference with the natural flow of surface water that causes an invasion of another's interests in the use and enjoyment of his land. The relative merits are discussed of the common enemy rule, the civil law rule and the reasonable use doctrine in determining liability for inter-ference with the flow of surface waters. The adop-tion of the reasonable use doctrine in Kentucky is recommended. (Proctor-Florida) W75-06620

INTERSTATE WATER COMPACTS,

BIBLIOGRAPHY,
Office of Water Research and Technology,

Washington, D.C. Available from the National Technical Information Service, Springfield, Va 22161, as PB-241 170, \$12.00 in paper copy, \$2.25 in microfiche. Water Resources Scientific Information Center, Report OWRT/WRSIC 75-205, March 1975, 488 p. Edited by Frank E. Maloney, College of Law, University of Florida.

*Interstate Descriptors: compacts. *Bibliographies, *Interstate commissions, Legislation, Legal aspects, *Water rights, *Water law, *River basin commissions, Water pollution control, Water resources development, Abstracts, Administrative agencies, Federal government, State governments, Flood control.

This report, containing 306 abstracts, is another in a series of planned bibliographies in water resources to be produced from the information base conprising SELECTED WATER RESOURCES ABSTRACTS (SWRA). At the time of search for this bibliography, the data base had 80,488 abstracts covering SWRA through January 15, 1975 (Volume 8, Number 2). Author and subject indexes are included. W75-06640

ORGANIZATIONAL PROBLEM-SOLVING, Kansas Water Resources Research Inst., Manhattan.

For primary bibliographic entry see Field 6B. W75-06643

PROCEEDINGS OF CONFERENCE 'TRENDS IN WATER MANAGEMENT',
Minnesota Univ., St. Paul. Water Resources Research Center.

Available from the National Technical Informa-No 80, January 1975, 49 p. OWRT A-999-MINN(35), 14-31-0001-5023.

Descriptors: *Water policy, Planning, *Water management(Applied), *Minnesota,

*Conferences, Administrative agencies, *Project planning, State government, Reviews, Operations.

The program of the Conference consisted of presentations of representatives of the U.S. Army Corps of Engineers, the Soil Conservation Service, the Upper Mississippi River Basin Commis sion, the Minnesota Pollution Control Agency, the Department of Natural Resources, and the State Planning Agency. The papers addressed questions of how the agency perceives its role as a water manager; how that perception is reflected in its operation. A review of current programs are comments on anticipated changes or new programs in the next few years, also were presented. (Waelti-Minnesota) W75-06647

SOVEREIGNTY OF THE SEAS AND THE EF-FECT UPON NAVAL STRATEGY,

Naval War Coll., Newport, R.I. E. L. Gallup.

Marine Affairs Journal, Number 1, p 1-8, December 1973.

Descriptors: *Oceans, *Territorial seas, *Military aspects, *International waters, Navigable waters, International law.

Identifiers: *Military strategy, *Naval strategy, *National sovereignty claims, *Marine sovereignty, *Freedom of the seas.

Limitations upon the use of the ocean imposed by various nationalities must have some effect upon naval strategy. Effects of alterations in the freedom of the seas concept upon naval strategies of major powers under varying conditions and levels of international conflict are explored. Since World War II, national sovereignty claims have increased over internal waters, special zones, seabed, territorial seas and the airspace above these areas. Sea claims during past wars and crises have necessitated an international agreement to reduce naval conflicts as well as define boundaries of naval, fishing and other activities. It would appear that world acceptance of a 12-mile territorial sea is most probable although a greater limit is possible. Regardless of whether the intended purpose of zones is to control pollution, to regulate fishing or avoid collision with offshore oil wells, the net result is a decreasing freedom of the seas. Naval strategy will be affected by the increasing restriction on the use of the ocean in inverse pro portion to the level of intensity of the conflict. The greatest impact of extension of marine sovereignty will occur in those situations least damaging to the national interests of the maritime powers or under conditions most amenable to alternate solutions. (Salzman-North Carolina)

ORGANIZING NEW ENGLAND COMMERCIAL FISHERMEN AT THE REGIONAL LEVEL, Rhode Island Univ., Kingston.

W. H. MacKenzie.

Marine Affairs Journal, Number 1, p 33-51, December 1973.

Descriptors: *Marine fisheries, *Fisheries, *Fish management, *New England, *Trade associations, Commercial fishing, Governments, Organizations. Identifiers: New England Fisheries Steering Committee(NEFSC), Atlantic Offshore Fish and Lobster Association(AOFLA), *200 mile fishing

New England commercial fishermen are organiz-ing to resolve problems among themselves and to influence fishing-related decisions at all levels of influence tishing-related decisions at all levels of government. This study details the formation, growth and operating procedures of the two regional New England efforts, Atlantic Offshore Fish and Lobster Association (AOFLA) and the New England Fisheries Steering Committee (NEFSC). The movement to organize grew in response to increasing international interests in fisheries combined with differences on coastal state rights. AOFLA has enlisted 53 fishermen and lobstermen as well as an executive secretary who hopes to solve off-shore gear conflicts and to fight for a 200 mile fishing zone. Unincorporated, AOFLA has only a draft set of by-laws, meager financial support and a weak political force. NEFSC also supports the 200 mile fishing zone. Comprised of fishing organizations and industries, as well as members of the government and science communities, NEFSC claims to be the regional spokesman, although no substantial evidence exists to support any kind of political or legal action. Organizing fishermen is not an easy task. If regional efforts become stronger, the next step may be affiliation with the National Federation of Fishermen. (Salzman-North Carolina) W75-06788

SET PROBE OF POLLUTION CONTROL AMENDMENTS

For primary bibliographic entry see Field 5G. W75-06827

NINE MILLION GALLONS PER DOWN THE DRAIN, FEDERAL GUIDELINES PRESENT A TOUGH CHALLENGE, For primary bibliographic entry see Field 5G.

6F. Nonstructural Alternatives

LAND-USE ISSUES: PROCEEDINGS OF A CON-FERENCE

Virginia Polytechnic Inst. and State Univ., Blacksburg. Water Resources Research Center. For primary bibliographic entry see Field 4A. W75-06359

REDESIGNING FLOOD MANAGEMENT - PRO-JECT AGNES PHASE I,

New York State Coll. of Agriculture and Life Sciences, Ithaca. Dept. of Agricultural D I Allee

Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 064, \$4.25 in paper copy, \$2.25 in microfiche. Completion Report, New York Water Resources and Marine Sciences Center, Ithaca, September 1976, 61 p. OWRT A-045-NY(2), 14-31-0001-4032.

Descriptors: *Flood control, *Flood protection, Flood recurrance interval, Non-structural alterna-tives, Flood forecasting, Water policy, Flood plains, Design flood, *Management, Risks, Local governments, Regional analysis, Evaluation, Land use, Warning systems, Flood plain zoning,

Identifiers: *Susquehanna River basin, *Flood

Four studies--a part of a larger program of flood related research--are reported here. Flood risk management has emphasized dams and channel modification. Also an elaborate set of relief programs has evolved. Now the harder to deal with tactics of inducing local governments to regulate tactics of inducing local governments to regulate flood plain use plus efforts to make development more flood sensitive are being more seriously addressed. These studies provide a background for this evolution of a broader mix of public programs. Evaluation of water resources planning in the Susquehanna River Basin suggests that a marked difference in perception of flood risk by planners and local leaders was not overcome and probably led to less acceptance of the planners represent and local leaders was not overcome and probably led to less acceptance of the planners proposals. Regional analysis techniques can provide a basis for restructuring flood relief payments so that the result is a more vigorous as well as a more flood sensitive, rebuilt community. Furthermore, en-vironmental analysis techniques that relate resource capacity to the requirements of land use activities provide a basis for relating flood risk to a wide variety of other local land use problems. Finally improvements in the hydrologic models used to estimate flood risks, particularly for small watersheds, can be improved by introducing nonlinear elements. The result should be more effective flood warnings and flood plain zoning.

CONFIDENCE LIMITS FOR DESIGN EVENTS, Department of the Environment, Ottawa (Ontario). Water Resources Branch. For primary bibliographic entry see Field 2E. W75-06544

HANDBOOK FOR A FLOOD PLAIN MANAGE-MENT STRATEGY, East-West Gateway Coordinating Council, St.

L. Zensinger, G. McClure, and P. Faulkner. Available from the National Technical Information Service, Springfield, Va 22161, as PB-235 878, \$3.75 in paper copy, \$2.25 in microfiche. Final report. May, 1974. 42 p, 5 fig, 6 tab, 2 append. HUD-CPA-1008.

Descriptors: *Flood control, *Flood plain zoning, *Flood plain insurance, *Flood protection, *Water policy, *Land use, Planning, Water manage-ment(Applied), Channel improvement, Abatement, Dams, Drainage systems, Erosion control, Flood plains, Reservoirs, Levees.

Identifiers: Development rights, Flood plain

Using data obtained from the Spring, 1973 flood, this report illustrates the need for regional and local flood control-management policies and suggests some immediate steps that can be taken by communities to reduce flood losses within their boundaries. Present protection proved inadequate for curtailing the \$97 million damages caused by the 1973 flood and a comprehensive flood control policy must include structural flood control devices (dams, reservoirs), levees, channel improvement, including deepening and clearing, and stabilization of riverbed with concrete. Non-structural flood control techniques include zoning, subdivision regulations, land use plan, building, hous-ing and sanitary codes and public or private acquisition of flood plain land or development rights. This latter recommendation is probably the most effective and economical means of reducing flood damages. Federal laws concerning flood insurance are explained and a program designed to establish the eligibility of all communities in the region to participate is developed. A public informa-tion program to emphasize the hazards of flood plain development is suggested. (Salzman-North Carolina W75-06764

FLOOD PLAIN INFORMATION: MILL CREEK, KOOSKOOSKIE AND VICINITY, WALLA COUNTY, WASHINGTON.
Army Engineer District, Walla Walla, Wash. For primary bibliographic entry see Field 4A. W75-06767

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FLOOD PLAIN INFORMATION: BLACKSNAKE CREEK, ST. JOSEPH, MISSOURI. Army Engineer District, Kansas City, Mo. For primary bibliographic entry see Field 4A. W75-06768

FLOOD PLAIN INFORMATION: NACHES RIVER, CITY OF NACHES AND VICINITY, WASHINGTON, Army Engineer District, Seattle, Wash. For primary bibliographic entry see Field 4A. W75-06769

FLOOD PLAIN INFORMATION: LITTLE BLUE RIVER, EAST FORK, WHITE OAK BRANCH, JACKSON COUNTY, MISSOURI, Army Engineer District, Kansas City, Mo. For primary bibliographic entry see Field 4A. W75-06770

SPECIAL FLOOD HAZARD INFORMATION: MILL CREEK, OREGON. UMATILLA COUNTY.

Army Engineer District, Walla Walla, Wash. For primary bibliographic entry see Field 4A. W75-06771

FLOOD PLAIN INFORMATION: YAKIMA RIVER, CITY OF SELAH AND VICINITY, WASHINGTON.

Army Engineer District, Seattle, Wash. For primary bibliographic entry see Field 4A. W75-06772

SPECIAL FLOOD HAZARD INFORMATION REPORT: BAYOU SARA, BAYOU SARA CREEK, NORTON CREEK, HELLS SWAMP BRANCH. VICINITY OF SARALAND, ALABAMA.

Army Engineer District, Mobile, Ala For primary bibliographic entry see Field 4A. W75-06773

FLOOD PLAIN INFORMATION: SPRING BRANCH, INDEPENDENCE, MISSOURI. Army Engineer District, Kansas City, Mo. For primary bibliographic entry see Field 4A.

URBAN SYSTEMS ENGINEERING DEMONSTRATION PROGRAM FOR HINDS, MADIS-ON, RANKIN COUNTIES, MISSISSIPPI, VOLUME IV. AREA-WIDE STORM DRAINAGE AND FLOOD PLAIN MANAGEMENT STUDIES. Clark, Dietz and Associates, Inc., Jackson, Miss. For primary bibliographic entry see Field 5D. W75-06785

COASTAL ZONE PLANNING: THE IMPACT OF REGIONAL EFFORTS IN NEW ENGLAND, Woods Hole Oceanographic Institution, Mass. S. H. Anderson. Marine Affairs Journal, Number 1, p 78-90, December 1973.

Descriptors: *Planning, *Coasts, *New England, *Coordination, Land use, Natural resources, Management. Identifiers: *Regional planning, *Coastal zone management.

Development of coastal zone planning in New England has benefited from regional efforts to induce information sharing and cooperative planning. Although no regional government structure exists, a number of private and public regional organiza-tions can provide significant inputs to comprehensive coastal resource planning. Some of these or-ganizations are described, followed by an analysis of the means by which a regional perspective may be further encouraged through citizen involvement. Six organizations have provided planners with means to develop alternative plans for coastal zone use, but at present, the actual coordination among the region's states and regional organiza-tions is fragmented. Ultimately, adherence to a plan is dependent on citizen support. To involve the public, defined by their occupational relationship to the coastal zone as well as specific interest groups, planners must provide public forums (town meetings), public surveys, workshops and citizens advisory boards. These channels, coupled with educational activities in schools, through promotional and research publications, and over the mass media will bring the public into the planning process and help develop a regional perspective in planning of the New England marine region. (Salzman-North Carolina) W75-06790

SPECIAL FLOOD HAZARD INFORMATION REPORT: GALLAGHER CREEK, MERIDIAN, LAUDERDALE COUNTY, MISSISSIPPI. Army Engineer District, Mobile, Ala. For primary bibliographic entry see Field 4A. W75-06792

PLAIN INFORMATION: ENASQUITOS DRAINAGE AREA, SAN DIEGO COUNTY, CALIFORNIA.

Army Engineer District, Los Angeles, Calif. For primary bibliographic entry see Field 4A. W75-06793

6G. Ecologic Impact Of Water Development

SOME PERSPECTIVES ON THE STATUS OF AQUATIC WADING BIRDS IN SOUTH FLORIDA

Bureau of Sport Fisheries and Wildlife, Atlanta,

J. P. Crowder.

Available from the National Technical Informa-Available 10th the National Technical Information Service, Springfield, Va 22161 as PB-235 216, \$3.25 in paper copy, \$2.25 in microfiche. South Florida Environmental Project: Ecological Report No. DI-SFEP-74-29, Feb. 1974. 13 p, 16 ref.

Descriptors: *Ecology, *Wading birds, *Environmental effects, *Florida, Nests, Water-Descriptors:

fowl, National Parks.
Identifiers: *Bird populations, *Everglades National Park(Fla), Breeding, Nesting, Wood Storks, White Ibis, Cattle Egret.

Relationships between wading birds, water levels, and other biota of the south Florida wetlands ecosystem are discussed. Data from other studies are consolidated to present information on wading birds in the Everglades National Park and the remainder of Florida south of Lake Okeechobee. A total of 35,000 breeding pairs of wading birds (excluding 22,500 pairs of cattle egrets) are all that is left of a once larger population of about 2.5 mil-lion in 1870. The effects of wetlands drainage on nesting success and broader implications of feed-ing and other ecological relationships of wading birds are discussed with emphasis on population size, feeding efficiency, predator-prey relation-ships, and stress. Particular emphasis is placed on wood stork, white ibis, and cattle egrets. Recommendations for preserving these birds are presented with a discussion of artificial feeding habitat. (Katz) W75-06397

THE EXOTIC VERTEBRATES OF SOUTH FLORIDA,

Bureau of Sport Fisheries and Wildlife, Atlanta,

J. P. Crowder.

Available from the National Technical Informa-Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 214, \$3.75 in paper copy, \$2.25 in microfiche. South Florida Environmental Project: Ecological Rept No. DI-SFEP-74-30, Feb. 1974, 38 p.

Descriptors: *Ecology, *Florida, *Fishes, Animal

Identifiers: *Exotic animals, *Tropical fish, Knight anole, Marine toad, Cuban treefrog, Walk-ing catfish, Native wildlife, Cichlids.

Species of introduced exotic vertebrates of south Florida (Lake Okeechobee southward) are identified and described. The principal factors responsible for their introductions are explored

Field 6-WATER RESOURCES PLANNING

Group 6G—Ecologic Impact Of Water Development

and recommendations are made for alleviation of current problems caused by exotics and for prevention of further harmful introductions. Major problems were determined to be (1) the rapid spread of exotic tropical fishes, principally cichlids and the walking catfish (Clarias batrachus) and their displacement of native sunfishes, and (2) the presence of a number of exotic psittacine birds with potential for depredations of fruit and grain crops, and (3) three species of giant herptiles (knight anole, marine toad, cuban treefrog) that prey upon their smaller native counterparts. (Katz) W75-06398

DRAFT ENVIRONMENTAL STATEMENT HTGR FUEL REFABRICATION PILOT PLANT AT THE OAK RIDGE NATIONAL LABORATO-

Oak Ridge National Lab., Tenn. For primary bibliographic entry see Field 5B. W75-06417

REPORT TO THE SONOMA CREEK ADVISO-RY COMMITTEE, SONOMA, CALIFORNIA, California Univ., Berkeley. Dept. of Landscape Architecture

For primary bibliographic entry see Field 6B.

ENVIRONMENTAL STUDIES (1973), BAY TERRITORY AND SURROUNDING AREA, Department of the Environment, Hull (Quebec); and James Bay Development Corp., Montreal 69 p, 22 fig, 101 ref.

Descriptors: *Environment, *Canada. *Ecosystems, *Cold regions, Air environment, Climatology, Hydrography, Hydrometry, Oceanography, Geology, Terrain analysis, Sedimentology, Water-fowl, Wetlands, Wildlife, Big game, Aquatic animals, Marine animals, Estuarine environment, Lakes, Rivers. Climatology, Identifiers: "James Bay(Canada).

Studies and biophysical inventories carried out in 1973 under the terms of the agreement signed between the James Bay Development Corporta-tion and Environment Canada were reported. Stu-dies in the following subjects were discussed: (1) atmospheric environment, (2) hydrography and oceanography, (3) terrain studies, (4) waterfowl and wetlands habitat, (5) wildlife, (6) aquatic fauna, (7) classification of ecological systems, (8) hydrometry, (9) water quality, and (10) man's activities in the territory. (Sims-ISWS)

ATTITUDES OF IDAHO RESIDENTS TOWARD FREE FLOWING RIVERS AS A WATER USE IN

IDAHO, Idaho Univ., Moscow. Dept. of Sociology and Anthropology.
For primary bibliographic entry see Field 6B.
W75-06525

THE WESTERNPORT BAY ENVIRONMENTAL

Victoria Ministry for Conservation, Melbourne (Australia). Westernport Bay Environmental Study. M. A. Shapiro.

Water (Journal of the Australian Water and Waste-water Association) Vol 1, No 4, p 9-13, December

Descriptors: *Baseline studies, *Regional development, *Environmental effects, *Australia, Descriptors: Gevelopment, "Environmental effects, "Australia, Surveys, Investigations, Harbors, Industries, Bays, Watersheds(Basins), Economic impact, So-cial impact, Wildlife habitats, Recreation facili-ties, Comprehensive planning. Identifiers: "Westernport Bay(Vic). The Westernport Bay area in southern Victoria (Australia) is noted for the wildlife it shelters, and provides a major recreational facility for metropolitan Melbourne. It is also one of only a few locations on the Australian coast which possess the factors of markets, labor, deep wa land quality and land availability required in a suitable site for the development of an industrial port complex. A cooridinated multidisciplinary study involving basic and applied research activi-ties is under way, with the responsibility for developing the comprehensive knowledge of the Bay and its catchment necessary for a balanced approach to planning its development. The projects involved within the structure of the Study are listed and briefly described. They range from studies of climate, geology and hydrology, through marine and littoral ecology to history, economics and sociology. The study is jointly financed by government and industry, and a major report is to be submitted in late 1974. (Levick-CSIRO) W75-06555

THE UNCERTAIN SEARCH FOR ENVIRON-MENTAL QUALITY, Yale Univ., New Haven, Conn. School of Law.

For primary bibliographic entry see Field 5G.

PRESERVATION AND ENHANCEMENT OF THE AMERICAN FALLS AT NIAGARA-FINAL REPORT TO THE INTERNATIONAL JOINT COMMISSION.

American Falls International Board, Buffalo, N.Y. June 1974. 78 p, 44 fig, 9 tab, 7 append.

Descriptors: *Erosion control, *Waterfalls, *Aesthetics, *Great Lakes Region, *International Joint Commission, Economic feasibility, Economic impact, Environmental effects, Economic impact, Environmental effects, Canada, United States, International Commissions, Scenery, Water resources development, Evaluation, Geology, Erosion, Engineering, Rivers, Engineering geology, Future planning(Projected), Forecasting, Alternative planning, Water management(Applied), Governmental interrelations.

Identifiers: *Environmental policy, *Niagara

A study was undertaken at the request of the United States and Canadian governments to investigate and report upon measures necessary to preserve or enhance the beauty of the American Falls at Niagara. The study was subsequently expanded to include aspects of public safety at the American Falls and at the Goat Island flank of the Horseshoe Falls. Extensive geological investiga-tions were conducted to determine what measures might be taken to control the erosion occurring at the crests of the Falls. Alternative measures were evaluated in terms of their aesthetic, economic, and environmental effects and proposals of varying cost are presented. It was concluded that the process of erosion and recession should be accepted as a dynamic part of the natural condition of the Falls and should not be interrupted. However, specific measures should be taken to restore the level of the Maid-of-the-Mist Pool and to protect the safety of visitors to the Falls. (Deckert-W75-06574

ENVIRONMENTAL DEFENSE FUND V. TEN-NESSEE VALLEY AUTHORITY. For primary bibliographic entry see Field 6E. W75-06580

ENVIRONMENTAL LAW-JUDICIAL REVIEW UNDER NEPA, For primary bibliographic entry see Field 5G. W75-06585

WARM SPRINGS DAM TASK FORCE V. GRIB-AWARDING CONTRACT FOR CONSTRUCTION OF MAJOR SECTION OF PROPOSED DAM AND RESERVOIR PROJECT). For primary bibliographic entry see Field 6E. W75-06608

PROVIDENCE RIVER AND HARBOR, RHODE ISLAND (FINAL ENVIRONMENTAL IMPACT

Corps of Engineers, Waltham, Mass. New England Div. For primary bibliographic entry see Field 5G.

CROSS CREEK WATERSHED PROJECT, WASHINGTON COUNTY, PENNSYLVANIA (FINAL ENVIRONMENTAL IMPACT STATE-

Soil Conservation Service, Washington, D.C. For primary bibliographic entry see Field 8A. W75-06616

ECOLOGICAL EFFECTS OF NUCLEAR STEAM ELECTRIC STATION OPERATIONS ON ESTUARINE SYSTEMS.

Maryland Univ., Prince Frederick. Center for Environmental and Estuarine Research. For primary bibliographic entry see Field 5C. W75-06621

EXPERIENCE WITH HYDROELECTRIC PRO-JECT ENVIRONMENTAL RELATIONSHIPS IN SOUTHEASTERN UNITED STATES, Army Engineer District, Savannah, Ga. For primary bibliographic entry see Field 8A.

W75-06675

THE STRUCTURE OF ECOSYSTEMS. Illinois Univ., Urbana. Center for Advanced Com-

J Theor Biol. Vol 41, No 3, p 535-546, 1973.
Identifiers: *Ecosystems, Energy, *Perturbation technique, *Input-output analysis, Production,

Input-output theory is developed for an ecosystem in terms of production and respiration energy flows. The theory reveals a 'structure' of the system by demonstrating the direct and indirect energy flow dependence of each member of the system upon the others. A method for tracing the direct and indirect element flows through ecosystem is proposed. The structure is determined for 2 examples and a perturbation technique for the energy flow is suggested.—Copyright 1974, Biological Abstracts, Inc.

W75-06722

PUBLIC PERCEPTIONS OF WATER QUALITY

AND THEIR EFFECT ON WATER-BASED RECREATION, Department of the Environment, Ottawa (Ontario). Water Planning and Management For primary bibliographic entry see Field 6B. W75-06752

INTERCOASTAL WATERWAY: AN ECOLOGICAL PERSPECTIVE,
Florida Atlantic Univ., Boca Raton. Dept. of Biological Sciences. For primary bibliographic entry see Field 5G.

KEY LAND USE ISSUES FACING EPA. Harbridge House, Inc., Boston, Mass. For primary bibliographic entry see Field 5G. W75-06780

7. RESOURCES DATA

7A. Network Design

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ADAPTATION AND APPLICATION OF THE KARAZEV METHOD TO THE RATIONALIZATION OF QUEBEC'S HYDROMETRIC BASIC

National Inst. of Scientific Research, Quebec. For primary bibliographic entry see Field 2E. W75-06454

MESOSCALE OBJECTIVE ANALYSIS OF THE WIND AND MOISTURE FIELD AROUND THE THUNDERSTORMS DEVELOPED OVER NSSL OBSERVATION NETWORK ON MAY 28, 1967, Meteorological Research Inst., Tokyo (Japan). For primary bibliographic entry see Field 2B. W75-06535

7B. Data Acquisition

THE REMOTE SENSING OF SUSPENDED SEDIMENT CONCENTRATIONS OF SMALL IMPOUNDMENTS, Agricultural Research Service, Chickasha, Okla. Southern Great Plains Watershed Research

H. B. Pionke, and B. J. Blanchard.

Water, Air and Soil Pollution, Vol 4, No 1, p 19-32, March 1975. 2 fig, 1 tab, 10 ref. NASA S-70251-AG. Task No. 5.

Descriptors: *Remote sensing, *Sediment transport, *Water pollution, Path of pollutants, Suspended solids, Aerial sensing, Analytical techniques, *Oklahoma.

The suspended sediment concentrations of 14 Oklahoma impoundments were related to bands of reflected light as measured from an aircraft-borne multispectral scanner. Suspended sediment con-centrations (Y) were curvilinearly related to reflectance (X) where the exponent on X exceeds one. The best relationships, upon consideration of sensitivity, range, and precision, appeared in the bands defined by 588 to 643 and 650 to 690 nm wavelength. The latter was less precise. The measured range in sediment concentration was 13 to 232 mg/liter. (ARS) W75-06399

DETERMINATION OF SOIL WATER DIF-FUSIVITY BY SORPTIVITY MEASUREMENTS, Agricultural Research Service, Riverside, Calif. Salinity Lab.

For primary bibliographic entry see Field 2G. W75-06438

A NEW CERAMIC CUP SOIL-WATER SAM-

Forest Service (USDA), La Crosse, Wis. Watershed Lab.
For primary bibliographic entry see Field 2G.
W75-06441

AMINES WATERS: **CALIFORNIA** COASTAL UTILIZATION PHYTOPLANKTON,

California Univ., Irvine. Dept. of Developmental

and Cell Biology.
For primary bibliographic entry see Field 5A.
W75-06443

A RADIOSONDE THERMAL SENSOR TECHNIQUE FOR MEASUREMENT OF AT-MOSPHERIC TURBULENCE,

National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center. For primary bibliographic entry see Field 2B.

W75-06476

PROCEDURES MANUAL FOR DETECTION AND LOCATION OF SURFACE WATER USING ERTS-1 MULTISPECTRAL SCANNER DATA, VOLUME I - SUMMARY.

National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center. For primary bibliographic entry see Field 7C. W75-06484

A PORTABLE AEROSOL DETECTOR OF HIGH SENSITIVITY

State Univ. of New York, Albany. Atmospheric Sciences Research Center. For primary bibliographic entry see Field 5A. W75-06496

CALIBRATION OF THE POLLAK COUNTER WITH MONODISPERSE AEROSOLS, Minnesota Univ., Minneapolis. Particle Technolo-

For primary bibliographic entry see Field 5A. W75-06497

AN APT SIGNAL SIMULATOR,

New York State Coll. of Agriculture and Life Sciences, Ithaca. Div. of Atmospheric Sciences. W. W. Knapp, and P. S. Sanik.

Journal of Applied Meteorology, Vol 14, No 1, p. 132-135. Express 1973. 3 for 1, p. 1.

132-135, February 1975. 3 fig, 1 ref.

Descriptors: *Instrumentation, *Remote sensing, *Satellites(Artificial), Infrared radiation, Electronic equipment, Electrical engineering, Testing

procedures.
Identifiers: *Signal simulators, Scanning radiometers, Automatic picture transmission.

An inexpensive device designed to simulate video signals produced by the scanning radiometer system used on current NOAA series satellites was described. The simulator features independent control of both visible and infrared channel video levels during periods corresponding to the earth scan portions of each scan line. The known and adjustable signal levels provided by this simulator unit simplify the tasks of calibration, adjustment, and servicing APT display systems. (Sims-ISWS) W75-06501

THE USE OF A VERTICALLY POINTING PULSED DOPPLER RADAR IN CLOUD PHYSICS AND WEATHER MODIFICATION STUDIES.

Washington Univ., Seattle. Dept. of Atmospheric For primary bibliographic entry see Field 3B. W75-06507

DUAL DOPPLER RADAR COORDINATION USING NOMOGRAMS, Oklahoma Univ., Norman. Dept. of Meteorology.

For primary bibliographic entry see Field 2B. W75-06510

AERIAL RADIOLOGICAL MEASURING SUR-VEY OF THE MAINE YANKEE ATOMIC POWER PLANT SEPTEMBER 1971. EG and G, Inc., Las Vegas, Nev. For primary bibliographic entry see Field 5A. W75-06630

AERIAL RAIOLOGICAL MEASURING SUR-VEY OF THE FORT ST. VRAIN NUCLEAR GENERATING STATION OCTOBER 1971, EG and G, Inc., Las Vegas, Nev. For primary bibliographic entry see Field 5A. W75-06631

AERIAL RADIOLOGICAL MEASURING SUR-VEY OF THE PRAIRIE ISLAND NUCLEAR GENERATING PLANT SEPTEMBER 1971, 2G and G, Inc., Las Vegas, Nev.

For primary bibliographic entry see Field 5A. W75-06632

AERIAL RADIOLOGICAL MEASURING SUR-VEYS OF THE TURKEY POINT STATION APRIL 1972. EG and G, Inc., Las Vegas, Nev.

For primary bibliographic entry see Field 5A. W75-06633

AERIAL RADIOLOGICAL MEASURING SUR-VEY OF THE PILGRIM STATION SEPTEMBER

EG and G, Inc., Las Vegas, Nev. For primary bibliographic entry see Field 5A. W75-06634

AERIAL RADIOLOGICAL MEASURING SUR-VEY OF THE INDIAN POINT STATION AU-GUST 1969,

EG and G, Inc., Las Vegas, Nev. For primary bibliographic entry see Field 5A. W75-06635

THE USE OF A MODIFIED GULF V PLANK-TON SAMPLER FROM A SMALL OPEN BOAT, Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Lab. S. J. Lockwood.

J Cons Cons Int Explor Mer. Vol 35, No 2, p 171-174, 1974, Illus.

Descriptors: Sampling, *Plankton, *Equipment, Identifiers: *Gulf V Plankton Sampler, Samplers.

The sampler is made from marine grade aluminum, is 50 cm in diameter, 213 cm long and weighs 30 kg in air when fully rigged. It had been used successfully from an 8 m Yorkshire cable in depths considerably less than 10 m as well as in greater depths. Two davits were wedged in the boat's side to carry the sampler in a position which reduced handling to a minimum. The warp was paid away and hauled either by a manual winch or with the aid of a crab-pot hauler. Towing speed was set by reference to the engine tachometer but the external flowmeter reading gave an accurate measure of consistency. The coefficient of variation was less than 10% of the mean. By comparison the coefficient of variation rose as high as 46% when the sampler was towed by a 15 m keel boat.--Copyright 1974, Biological Abstracts, Inc. W75-06707

AN AIR-LIFT FOR QUANTITATIVE SAM-PLING OF THE BENTHOS.

Hull Univ. (England). Dept. of Zoology. R. G. Pearson, M. R. Litterick, and N. V. Jones Freshwater Biol. Vol 3, No 4, p 309-315, 1973,

Identifiers: *Air-lift sampling, *Benthos, Fauna, Quantitative samplers, *Sampling, Surber sampler, Allan grab.

A new air-lift which quantitatively samples the fauna from a variety of substrate at a range of water depths, and which is operated by 1 person, is described. Performance of the sampler under different conditions is discussed and comparisons are made between the air-lift and a Surber sampler and an Allan grab .-- Copyright 1974, Biological Abstracts, Inc. W75-06713

Field 7—RESOURCES DATA

Group 7B—Data Acquisition

ANALYSIS OF MASS BALANCE VALUES AND THEIR ACCURACY FOR SENTINEL GLACIER, BRITISH COLUMBIA, CANADA,

Department of the Environment, Ottaw (Ontario). Water Resources Branch. For primary bibliographic entry see Field 2C. W75-06740

SIMPLE COLOUR METER FOR LIMNOLOGICAL STUDIES,

Canada Centre for Inland Waters, Burlington

K. P. B. Thomson, J. Jerome, and H. W. MacPhail. Scientific Series No. 49, 13 p, 1974, Inland Waters Directorate. 12 fig, 5 ref, 2 tab.

Descriptors: *Water analysis, *Color,
*Measurement, Organoleptic properties, Instrumentation, Tracking techniques, Water circulation, Turbidity, Research and development,
Remote sensing, Canada, Lake Superior.
Identifiers: *Irradiance, *Color meters, Meters.

A simple in situ irradiance meter for objective measurement of water color has been designed and built by the Remote Sensing Section at Canada Centre for Inland Waters. The principle of the instrument is to measure the upwelling natural irradiance close to the surface at two selected wavelengths and express these as a ratio or color index. Experiments carried out with this instrumentation in Lake Superior have shown that the color indices can be used as water-mass tracers with midlake and near-shore regions being clearly identified. Results also show that the color indices provide a useful measurement of the relative turbidity characteristics of large lakes. (Environment Canada)

PEAK FLOWS BY THE SLOPE-AREA METHOD.

Department of the Environment, Ottawa (Ontario). Water Resources Branch. For primary bibliographic entry see Field 2E. W75-06745

TRANSIENT RESPONSE OF SHALLOW ENCLOSED BASINS USING THE METHOD OF NORMAL MODES,

Canada Centre for Inland Waters, Burlington (Ontario). For primary bibliographic entry see Field 2H. W75-06746

REMOTE SENSING,

Bureau of Reclamation, Washington, D.C. R. R. Ledzian. Reclamation ERA, Vol 60, No 4, p 8-18, Autumn 1974. 11 fig.

Descriptors: *Remote sensing, *Malytical techniques, *Radar, *Water supply, *Groundwater development, Water resources. Identifiers: *Earth Resources Technology Satellite(ERTS), *Earth Resources Observation

lite(ERTS), *Earth Resources Observation
Systems(EROS), Data Collective Platform(DCP),
Multispectral scanner(MSS), Return beam
vidicon(RBV).

Remote sensing is the acquisition of data from a distant platform for detecting the nature of an object without actually touching it. This technology which increases man's knowledge of his finite resources ranges from very short wave lengths at which gamma rays are emitted to the comparatively long wavelengths at which radar operates. Earth Resources Technology Satellite (ERTS) orbits the earth in 103 minutes, crossing the same spot at the same time every 18 days, permitting comparison of images with the same sun angle. Two imaging systems sense and record radiation in several visi-

ble and near-infrared bands. Multispectral analysis, change detection analysis, and pattern recognition techniques are used to translate spectral, temporal and spatial characteristics of the satellite data into a valuable tool for planning and manage-ment of natural resources. Some uses of remote sensing are: to monitor environment during construction; to delineate area of shallow groundwater on agricultural lands; to forecast run-off; to take inventory of irrigated lands and cropping patterns to determine changes in area for improved water use; to aid in flood plain mapping in demonstrating that the Mississippi Basin could be mapped for less than \$20,000 to determine the extent of inundation, to assess regional effectiveness of flood control measures, and to identify areas where significant changes may be required to avoid disasters; to provide data on discharge of industrial waste effluents into lakes and streams. turbidity patterns and oil slick patterns which indicate pollution tracks; to locate water impoundments under the national dam inspection program. (Salzman-North Carolina)

ELECTRON-MICROSCOPICAL INVESTIGA-TIONS ON WAX-COVERED STOMATAS, (IN GERMAN),

Universitaet Hohenheim (Landwirtschaftliche Hochschule) (West Germany) Laboratorium fuer Elektronenmikroskopie.

For primary bibliographic entry see Field 2I. W75-06842

7C. Evaluation, Processing and Publication

AGRICULTURAL DROUGH PROBABILITIES IN TENNESSEE,

Tennessee Univ., Knoxville. Dept. of Plant and Soil Science. For primary bibliographic entry see Field 3F. W75-06358

A WATER QUALITY MODEL TO EVALUATE WATER MANAGEMENT PRACTICES IN AN IRRIGATED STREAM-AQUIFER SYSTEM, Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 5G.

A COMPILATION OF AUSTRALIAN WATER QUALITY CRITERIA, Caulfield Inst. of Tech., (Australia).

Caulfield Inst. of Tech., (Australia). For primary bibliographic entry see Field 5G. W75-06418

INTERNATIONAL HYDROLOGICAL DECADE REPRESENTATIVE AND EXPERIMENTAL BASINS IN THE UNITED STATES: CATALOG OF AVAILABLE DATA AND RESULTS, 1965-1972.

National Committee for the International Hydrological Decade, Washington, D.C. For primary bibliographic entry see Field 2A. W75-06472

SKYLAB STUDY OF WATER QUALITY, Kansas Univ., Lawrence. For primary bibliographic entry see Field 5A. W75-06478

FLOODWAY DETERMINATION USING COM-PUTER PROGRAM HEC-2, Hydrologic Engineering Center, Davis, Calif.

V. R. Bonner. Training Document No. 5, May 1974. 38 p, 1 fig, 5 ref, 3 append. Descriptors: *Computer models, *Floodways, *Hydrology, Flood plains, Channels, Hydraulics, Flow profiles, *Computer programs, Programs, Data processing, Flood routing, Training, Model studies.

Identifiers: HEC-2 computer program.

This document illustrated how computer program HEC-2 can be used to develop a designated flood way as required for Type 15 flood insurance studies. It was assumed that the reader has a knowledge of the basic input requirements. The computer procedure for delineating a floodway includes: (1) the development of water surface profiles under natural conditions (i.e., prior to encroachment) and (2) the delineation of a designated floodway that meets certain requirements. The procedure in the HEC-2 encroachment routines allows a program user to make the preliminary estimate of a designated floodway in one operation of the program. Additional computer runs may be made to improve the acceptability of the floodway. The computerized procedure was discussed and illustrated in an example problem. Appendixes contain a hand calculation example to illustrate the procedure, and first and second trials of a simple problem using the HEC-2 program. (Sims-ISWS)

APPLICATION OF THE HEC-2 BRIDGE ROU-

TINES, Hydrologic Engineering Center, Davis, Calif. V. R. Bonner

Training Document No 6, June 1974. 73 p, 12 fig, 12 ref, 3 append.

Descriptors: *Computer models, *Bridges, *Flow resistance, Hydrology, *Computer programs, Data processing, Programs, Model studies, Flow characteristics, Hydraulic design, River flow, Dams, Weirs, Training.

Identifiers: HEC-2 computer program.

This document assists the HEC-2 program user in preparing input for the bridge routines. An understanding of the basic program input requirements was assumed. The program computes the energy loss caused by structures such as bridges and culverts in two parts. One part consists of the losses that occur in reaches immediately upstream and downstream from the bridge where contraction and expansion of the flow is taking place. The second part consists of losses at the structure itself. As an alternative to having the program compute the losses, it is possible to input a loss (or water surface elevation) determined externally from the program. Appendixes contain examples of three different types of computer runs. (Sims-ISWS)

PROCEDURES MANUAL FOR DETECTION AND LOCATION OF SURFACE WATER USING ERTS-1 MULTISPECTRAL SCANNER DATA, VOLUME I - SUMMARY.

National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center. JSC-08454, Revision A, December 1973. 45 p, 8 ref, 3 append.

Descriptors: *Remote sensing, *Surface waters, *Analytical techniques, *Mapping, Satelites(Artificial), Data processing, Data collections, Maps, Instrumentation, Locating, Meteorological data, Computers. Identifiers: ERTS-1, Multispectral scanner.

A computer-aided procedure, for use in the detection and location of areas of surface water, was developed by the Earth Observations Division at the Lyndon B. Johnson Space Center. The procedure was developed in support of the National Program of Inspection of Dams established by Public Law 92-367. The procedure utilizes data acquired by the unmanned Earth Resources

Technology Satellite (ERTS-1) in conjunction with ancillary data in the form of topographic and highway maps and meteorological data summaries. The procedure is divided into several distinct phases. A five-volume manual was prepared to in-struct potential users of the procedure. This first volume of the procedures manual summarizes the total computer-aided procedure, presents the resource requirements for implementation, and discusses operational use of the information derived from the procedure. (Sims-ISWS)

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METEOROLOGICAL INTERPRETATION OF SPACE PHOTOGRAPHS OF THE EARTH (QUANTITATIVE METHODS),

D. M. Sonechkin. Available from the National Technical Informa-Available from the National Technical informa-tion Service, Springfield, Va 22161 as NASA TTF-786, \$5.75 in paper copy, \$2.25 in microfiche. NASA Technical Translation F-786, February 1975. 138 p, 26 fig, 10 tab, 175 ref, append. Trans-lated from Meteorologicheskoye Deshifrirovaniye kosmicheskikh Snimkov Zemli (Kolichestvennyye Metody), Hydrometerological Press, Leningrad (USSR), 1972, 130 p.

Descriptors: *Remote sensing, *Satellites(Artificial), *Meteorology, *Translations, Infrared radiation, Cloud cover, Photography, Automation, Data processing, Telemetry. Identifiers: Television, Geographic control.

A systematic exposition is presented of the procedures and results of meteorological interpretation of television and infrared images of the earth, obtained with the aid of satellites. Main attention was devoted to quantitative methods. Modern techniques of pattern recognition as the methodical basis of quantitative interpretation of earth photographs were surveyed. (Sims-ISWS) W75-06488

ESTIMATING THE VARIANCE OF TIME AVERAGES, Hawaii Univ., Honolulu. Dept. of Information and

Computer Science.

Company Common Method M

*Mathematical Descriptors: studies, **Climatology, Average, *Time series analysis, Statistical methods, Mathematics, Markov processes, Meteorology, Equations, *Estimating. Identifiers: Variance, Weighted averages.

The variance of a time average of a stationary time series depends on the spectral density near frequency zero rather than on the variance of the process. Equations were given for estimating the variance of a time average by fitting a low-order autoregression to the data. Details were given for selecting the order of the autoregression. An example was presented which uses an analysis of variance approach for testing for climatic trends, allowing for diurnal and annual variability and serial correlation. (Sims-ISWS)

EMPIRICAL ESTIMATES OF THE STANDARD ERROR OF TIME-AVERAGED CLIMATIC

MEANS, National Center for Atmospheric Research, Boulder, Colo.

Boulder, Colo. R. Madden, and W. Sadeh. Journal of Applied Meteorology, Vol 14 No 2, p 164-169, March 1975. 2 fig, 2 tab, 11 ref.

Descriptors: *Mathematical *Climatology, *Time series analysis,
*Atmospheric pressure, Statistical methods, Markov processes, Average, Meterology, Seasonal, Statistics. Identifiers: Standard errors, Time-averaged

The standard error of yearly and seasonally time-averaged station pressure values was estimated directly from a 49-year time series. The results compare well with similar estimates inferred from the autocorrelation of the pressure data. The effect of seasonal variability in the autocorrelation on this standard error was indicated and a possible implication for numerical climatic-change experiments was proposed. (Sims-ISWS) W75-06503

THE SPECTRAL REPRESENTATION OF MOISTURE,

Atmospheric Environment Service, Montreal (Quebec).

Journal of Applied Meteorology, Vol 14, No 2, p 175-179, March 1975. 4 fig, 5 tab, 4 ref.

Descriptors: *Moisture, *Humidity, *Dew point, *Model studies, Computer models, Mathematical studies, Numerical analysis, Atmosphere, Water vapor. Identifiers: *Dew point depression, Mixing ratio.

Some experiments were performed, which were designed to compare the representation efficiency of dew point depression, relative humidity, and mixing ratio, with a view to incorporating moisture into a spectral model. A score was defined based on the ability of a finite spherical harmonic series for a given variable to reconstitute the grid-point fields of dew point depression, relative humidity, and mixing ratio. Based on this measure, the conclusion was reached that a finite series of dew point depression is slightly superior to a similar se-ries of relative humidity in being able to represent the grid-point structure of the three fields, and a great deal better than mixing ratio. (Jones-ISWS) W75-06505

REPRESENTATIVENESS OF WATERSHED PRECIPITATION SAMPLES, West Virginia Univ., Morgantown. Water

Research Inst. For primary bibliographic entry see Field 2B. W75-06522

COMPREHENSIVE WATER **OUALITY** MANAGEMENT PLANNING,

MANAGEMENT PLANNING,
Pennsylvania Dept. of Environmental Resources,
Harrisburg. Office of Comprehensive Water and
Wastewater Management Planning.
For primary bibliographic entry see Field 5G.
W75-06558

MODERNIZATION OF NATIONAL WEATHER SERVICE RIVER FORECASTING TECHNIQUES.

National Weather Service, Silver Spring, Md. For primary bibliographic entry see Field 4A. W75-06562

LONG-TERM RECONSTRUCTION OF WATER LEVEL CHANGES FOR LAKE ATHABASCA BY ANALYSIS OF TREE RINGS, Arizona Univ., Tucson. Lab. of Tree-Ring

For primary bibliographic entry see Field 4A. W75-06569

AUTOMATED DATA PROCESSING TECHNIQUES IN THE WATER SURVEY OF CANADA.

Department of the Environment, Ottawa (Ontario). Water Resources Branch.

W.J. Ozga.
Technical Bulletin No. 84, 29 p, 1974, Inland
Waters Directorate, Ottawa, 15 fig.

Descriptors: *Canada, *Hydrologic data, Equipment, Technology, *Data processing, Computers, Streamflow, *Automation, Data storage and retrieval, Publications, Surveys, Computer programs. Identifiers: Hydrometrics.

Automated data processing techniques were introduced in the Water Survey of Canada in 1966 along two fronts: (a) computation of streamflow data using a digitizer, and (b) storage of hydrometric data on magnetic tape. General procedures for the collection, computation and publication of basic hydrometric data are explained. However, the main purpose is to summarize the events leading to a uteration and the factors and problems in ing to automation and the factors and problems involved in the selection and implementation of the system as it now exists. (Environment Canada) W75-06731

PROGRAM SOPH - SIMULATION OF TIME-VARIANT PIEZOMETRIC SURFACE IN A CONFINED AQUIFER SUBJECT TO PUMPING, Department of the Environment, Ottawa (Ontario). Water Resources Branch. For primary bibliographic entry see Field 4B. W75-06737

SUMMARY REPORT OF MICROBIOLOGICAL BASELINE DATA ON LAKE SUPERIOR, 1973, Canada Centre for Inland Waters, Burlington (Ontario). For primary bibliographic entry see Field 2H. W75-06738

ALMOST-PERIODIC, STOCHASTIC PROCESS OF LONG-RANGE CLIMATIC CHANGES, Colorado State Univ., Fort Collins.
For primary bibliographic entry see Field 2B. W75-06739

COMPUTER ROUTINE FOR CALCULATING TOTAL LAKE VOLUME CONTENTS OF A DIS-SOLVED SUBSTANCE FROM AN ARBITRARY DISTRIBUTION OF CONCENTRATION PROFILES - A METHOD OF CALCULATING LAKEWIDE CONTENTS OF DISSOLVED SUB-STANCES.

Canada Centre for Inland Waters, Burlington For primary bibliographic entry see Field 2H. W75-06748

GROUND-WATER LEVELS AND WELL RECORDS FOR CURRENT OBSERVATION WELLS IN IDAHO, 1922-73, PARTS A, B, AND

Geological Survey, Boise, Idaho. For primary bibliographic entry see Field 4B. W75-06753

FLOOD STAGES AND DISCHARGES FOR SMALL STREAMS IN TEXAS, 1972, Geological Survey, Austin, Tex. For primary bibliographic entry see Field 4A. W75-06754

AN ASSESSMENT OF AREAL AND TEMPORAL VARIATIONS IN STREAMFLOW QUALITY USING SELECTED DATA FROM THE NATIONAL STREAM QUALITY ACCOUNTING NETWORK,

Geological Survey, Reston, Va. For primary bibliographic entry see Field 5B. W75-06755

GROUND-WATER DATA FOR MICHIGAN, Geological Survey, Lansing, Mich. G. C. Huffman. Geological Survey Data Report, 1974. 86 p, 34 fig, 2 tab, 43 ref.

Field 7—RESOURCES DATA

Group 7C—Evaluation, Processing and Publication

Descriptors: *Data collections, *Hydrologic data, *Groundwater, *Michigan, Water levels, Water wells, Water yield, Aquifers, Drawdown, Water quality.

Records of water levels in principal aquifers of Michigan through 1973 and other related data such as records of groundwater pumage, are presented. Also included are data on municipal, public, and industrial water-supply facilities. Records of water levels in areas of heavy pumpage and in areas where changes are principally due to natural influences are illustrated or tabulated to allow comparison between these types of water-level fluctuations. Numerous hydrographs are included to illustrate changes in water levels. Shown in summary form are supplementary data on the yield of wells, pumpage, storage facilities, treatment, quality of water, and trends of groundwater levels for 1973 and for part of the previous record. (Knapp-USGS)

A SURVEY OF THE WATER RESOURCES OF ST. CROIX, VIRGIN ISLANDS, Geological Survey of Puerto Rico, San Juan. For primary bibliographic entry see Field 4A. W75-06757

FLOOD PLAIN INFORMATION: MILL CREEK, KOOSKOOSKIE AND VICINITY, WALLA WALLA COUNTY, WASHINGTON. Army Engineer District, Walla Walla, Wash. For primary bibliographic entry see Field 4A. W75-06767

FLOOD PLAIN INFORMATION: BLACKSNAKE CREEK, ST. JOSEPH, MISSOURI. Army Engineer District, Kansas City, Mo. For primary bibliographic entry see Field 4A. W75-06768

FLOOD PLAIN INFORMATION: NACHES RIVER, CITY OF NACHES AND VICINITY, WASHINGTON, Army Engineer District, Seattle, Wash.

Army Engineer District, Seattle, Wash. For primary bibliographic entry see Field 4A. W75-06769

FLOOD PLAIN INFORMATION: LITTLE BLUE RIVER, EAST FORK, WHITE OAK BRANCH, JACKSON COUNTY, MISSOURI, Army Engineer District, Kansas City, Mo. For primary bibliographic entry see Field 4A.

SPECIAL FLOOD HAZARD INFORMATION: MILL CREEK, UMATILLA COUNTY, OREGON.

Army Engineer District, Walla Walla, Wash. For primary bibliographic entry see Field 4A. W75-06771

W75-06770

FLOOD PLAIN INFORMATION: YAKIMA RIVER, CITY OF SELAH AND VICINITY, WASHINGTON.

Army Engineer District, Seattle, Wash. For primary bibliographic entry see Field 4A. W75-06772

SPECIAL FLOOD HAZARD INFORMATION REPORT: BAYOU SARA, BAYOU SARA CREEK, NORTON CREEK, HELLS SWAMP BRANCH, VICINITY OF SARALAND, ALABAMA.

Army Engineer District, Mobile, Ala. For primary bibliographic entry see Field 4A. W75-06773 FLOOD PLAIN INFORMATION: SPRING BRANCH, INDEPENDENCE, MISSOURI. Army Engineer District, Kansas City, Mo. For primary bibliographic entry see Field 4A. W75-06779

SPECIAL FLOOD HAZARD INFORMATION REPORT: GALLAGHER CREEK, MERIDIAN, LAUDERDALE COUNTY, MISSISSIPI. Army Engineer District, Mobile, Ala. For primary bibliographic entry see Field 4A. W75-06792

FLOOD PLAIN INFORMATION: LOS PENASQUITOS DRAINAGE AREA, SAN DIEGO COUNTY, CALIFORNIA.
Army Engineer District, Los Angeles, Calif. For primary bibliographic entry see Field 4A.

8. ENGINEERING WORKS

8A. Structures

SAN LUIS UNIT, TECHNICAL RECORD OF DESIGN AND CONSTRUCTION - VOLUME II, DESIGN, SAN LUIS DAM AND PUMPING-GENERATING PLANT, O'NEILL DAM AND PUMPING PLANT, Bureau of Reclamation, Denver, Colo.

Bureau of Reclamation, Denver, Colo. November 1974. 375 p, 203 fig, 7 tab, 9 append.

Descriptors: *Dams, *Dumping plants, *Powerplants, *Central Valley Project, Electric powerplants, Hydroelectric plants, Dam design, Dam construction, Earth dams, Reserovirs, Design flood, Spillways, Outlet works, Electrical equipment, Cranes, Construction equipment, *California, Hydraulics.

Volume II discusses in considerable detail the design of the San Luis dam and pumping-generating plant and the O'Neill dam and pumping plant. These facilities are part of the San Luis unit, a major addition to the Central Valley Project. The unit is a storage facility for excess water from the delta area, fed by streams of the Sierra Range during winter and spring runoff, that would normally waste into the Pacific Ocean. The design of the two dams was described in detail with many drawings and photographs. Also described were the spillway and outlet works, the pumping and generating plants, and the electrical switchyard facilities. (Sims-ISWS)

JACKSON HOLE FLOOD CONTROL PROJECT.

Committee on Channel Stabilization (Army). For primary bibliographic entry see Field 4A. W75-06475

APPLICATION OF THE HEC-2 BRIDGE ROU-TINES,

Hydrologic Engineering Center, Davis, Calif. For primary bibliographic entry see Field 7C. W75-06482

BASIC UNDERSTANDING OF EARTH TUN-NELING BY MELTING, VOLUME I - BASIC PHYSICAL PRINCIPLES,

Westinghouse Astronuclear Lab., Pittsburgh, Pa. D. L. Black.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 084, \$7.00 in paper copy, \$2.25 in microfiche. DOT-TSC-OST-74-6.I, July 1974. 155 p, 45 fig, 8 tab, 53 ref. DOT-TSC-591. Descriptors: "Tunneling, "Tunneling machines, "Tunnel linings, "Construction, Geology, Melting, Rocks, Soils, Physical properties, Chemical properties, Thermal power.
Identifiers: "Thermal tunneling, Glass.

A novel technique which employs the melting of rocks and soils as a means of excavating or tunnel-ing while simultaneously generating a glass tunnel lining and/or primary support was studied. The object was to produce a good basic understanding of the fundamental process, its limits and capabilities, as applied to large scale (approximately 10 m diameter) transportation tunnels. A description of process was developed through the use of func-tional flow diagrams, from which five modes of thermal tunneling were defined, ranging from complete debris consolidation into the liner to complete extrusion and removal of the debris. For calculation purposes, five geologic modes of the near-surface continental crust were presented as representative of approximately 95% of the total land area, from unconsolidated sediments to igne-ous rocks. Thermophysical properties were synthesized from the composition of the components. Basic physical principles were used to derive functional equations governing the primary process variables in five separate areas. Thermal power and penetrator temperature were discussed in Volume I. Thrusting Force, earth structural properties, and meltdown were discussed in Volume II. (See also W75-06490) (Sims-ISWS) W75-06489

BASIC UNDERSTANDING OF EARTH TUN-NELING BY MELTING, VOLUME II - EARTH STRUCTURE AND DESIGN SOLUTIONS, Westinghouse Astronuclear Lab., Pittsburgh, Pa. D. L. Black.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 085, 88.50 in paper copy, \$2.25 in microfiche. DOT-TSC-OST-74-6.II, July 1974. 325 p, 66 fig, 4 tab, 46 ref, 2 append. DOT-TSC-591.

Descriptors: "Tunneling, "Tunneling machines, "Tunnel linings, "Construction, Loads(Forces), Earth materials, Structural analysis, Structural geology, Structural behavior, Cooling. Identifiers: "Thermal tunneling, Glass.

A novel technique which employs the melting of rocks and soils as a means of excavating or tunneling while simultaneous generating a glass tunnellining and/or primary support was studied. The object was to produce a good basic understanding of the fundamental process, its limits and capabilities, as applied to large scale (approximately 10 m diameter) transportation tunnels. Basic physical principles were used to derive functional equations governing the primary process variables in five separate areas. Thermal power and penetration temperature were discussed in Volume I. Thrusting force, earth structural properties, and melt cooldown were discussed in Volume II. (See also W75-06490) (Sims-ISWS)

BIOLOGICAL, CHEMICAL AND RELATED ENGINEERING PROBLEMS IN LARGE STORAGE LAKES OF TASMANIA, Hydro-Electric Commission, (Australia). Civil Engineering Div. For primary bibliographic entry see Field 4A. W75-66556

CROSS CREEK WATERSHED PROJECT, WASHINGTON COUNTY, PENNSYLVANIA (FINAL ENVIRONMENTAL IMPACT STATE-

Soil Conservation Service, Washington, D.C. Available from the National Technical Information Service as EIS-PA-74-0049-F. January 7, 1974. 142 p, 2 fig. 15 tab.

Descriptors: *Flood protection, *Watershed management, *Erosion control, *Dam construction, Recreation facilities, *Pennsylvania, Erosion, Sedimentation, Dams, Flood control, Flood recurrence interval, Flooding, Floods, Streams, Sediments, Recreation, Recreation demand, Lakes, Parks, Water supply, Water storage, Fish, Fishing, Fish passages, Flood plains. Identifiers: *Environmental Impact Statements, *Crosscreek Watershed Project(Penn). *Crosscreek Watershed Project(Penn).

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The program entails construction of a watershed protection and flood prevention project for the Cross Creek Watershed in Washington County, Pennsylvania. Land treatment measures will be applied to control erosion and reduce stream sedi-mentation. Four dams will be built to provide flood protection from a 100-year frequency storm. One dam will also create a recreation lake and store millions of gallons of water for municipal use. The millions of gallons of water for municipal use. The lake and accompanying recreation facilities will form the nucleus of a 7500 acre county park. The environmental impact of the project will provide for the following beneficial effects: reduction of flood damage by 92 percent; reduction of soil erosion by 27 percent; reduction of sediment yield from the watershed by 46 percent; provide facilities for 150,000 annual visitor days of recreation; and provide adequate water supply for the present population plus supplies for an additional 500 families and industrial growth. Adverse environmental effects include temporary impairment of stream quality and fishery during construction; instream quality and fishery during construction; in-undation of covering of 14,370 feet of stream by dams, sediment pools, or other permanent imdams, sediment pools, or other permanent im-poundments; construction pollution; and restric-tion of fish passages by the dams. Alternatives in-clude land treatment only, land treatment acquisition of flood plain properties, land treat-ment and recreation only, land treatment and water supply only, or no action. (Gagliardi-Florida) W75-06616

EXPERIENCE WITH HYDROELECTRIC PROJECT ENVIRONMENTAL RELATIONSHIPS IN SOUTHEASTERN UNITED STATES,

Army Engineer District, Savannah, Ga. C. C. Brown, C. L. Carter, and F. H. Posey. U.S. Army Engineering District, Planning Board, Savannah, Georgia, (1970) 32 p. 8 fig. 1 tab, 16 ref.

Descriptors: *Environmental effects, *Hydroelectric plants, *Reservoir management, *Reservoir design, *Reservoir silting, Thermal stratification, Aeration, Water quality, Chemical wastes, Iron, Manganese, Flood control, Hydroelectric power, Dissolved oxygen, Destratification, Environmental engineering. Identifiers: Environmental impacts

The Corps of Engineers is charged with the responsibility for minimizing any adverse effect on the environment resulting from the construction and operation of its reservoirs. Many of the environmental problems so far identified are of thermal, chemical, or operational origin. Thermal stratification occurs in many reservoirs because of the detention time required for water to flow through the impoundment and the rate of heat exchange between the reservoir waters and the atmosphere. Seasonal changes in iron and manganese concentrations have been observed in large reservoirs. Increases in these metallic concentrations are apparently related to the decrease in dissolved oxygen. Operational requirements of reservoirs in the southeastern United States must convoirs in the southeastern United States must con-sider many purposes, including: flood control, navigation, hydroelectric power, domestic and in-dustrial water supply, fish and wildlife enhance-ment, recreation, and water quality control. Limited observations of specific tests show that turbine aeration is one means by which dissolved oxygen content of discharges can be improved. The early experience with destratification systems such as the air diffuser system under investigation at the Allatoona Project is encouraging. Evalua-

tion of effects on iron and manganese concentrations, and pH are considered inconclusive because of differences discovered in early sampling and analysis techniques. (Poertner) W75-06675

8B. Hydraulics

A THREE DIMENSIONAL WAVE MAKER, ITS THEORY AND APPLICATION,
Massachusetts Inst. of Tech., Cambridge. Dept. of

Civil Engineering.
For primary bibliographic entry see Field 2L.
W75-06457

PLUNGER-TYPE WAVEMAKERS: THEORY

AND EXPERIMENT, Tetra Tech, Inc., Pasadena, Calif. For primary bibliographic entry see Field 2L. W75-06458

HYDRAULIC MODEL STUDIES OF PLUNGE BASINS FOR JET FLOW, Bureau of Reclamation, Denver, Colo. Engineer-

ing and Research Center. P. L. Johnson.

Available from the National Technical Informa-tion Service, Springfield, Va 22161 as PB-235 659, \$3.25 in paper copp, \$2.25 in microfiche. REC-ERC-74-9, June 1974. 16 p, 9 fig, 9 ref.

Descriptors: *Scour, *Riprap, *Design criteria, *Laboratory tests, *Outlet works, Model studies, Jets, Tailwater, Hydraulic design, Hydraulic

Identifiers: *Plunge basins, Velocity head, Stilling

Model studies were conducted to develop design guidelines for riprap-lined plunge basins. Depres-sions scoured by free jets dropping into water-covered gravel beds were measured to determine basin dimensions. Design values of the criteria were selected so that further scour would not occur. The depth, length, and width of the plunge basin were found to be functions of the following parameters: (1) height of the outlet above tailwater surface, (2) pressure head on outlet, (3) outlet size, (4) tailwater depth, and (5) size of riprap. (Adams ISWS) W75-06492

WALL JET ANALOGY TO HYDRAULIC JUMP, Manchester Univ. (England). Inst. of Science and Technology. R. Narayanan

Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 101, No HY3, Proceedings Paper 11172, p 347-359, March 1975. 11 fig, 16 ref, 2 append.

Descriptors: *Hydraulic jump, *Hydraulics, *Open channels, *Turbulence, *Boundary processes, Velocity, Continuity equation, Reynolds number, Froude number, Momentum equation, Shear stress, Jets, Flow. Identifiers: Blasius equation, Displacement

Hydraulic jump on horizontal bed of a rectangular channel was treated as a plane turbulent wall jet of an incompressible fluid of finite width in adverse pressure gradient. Momentum integral techniques were applied to determine the longitudinal variations of the parameters characterizing the assumed mean velocity distribution. The kinematic constraint arising from the requirement of continuity was imposed. The idealized wall jet was modified to take into account the mean velocity distribution ahead of the jumps that is typical of most of the experimental situations. The mean flow properties of jumps at high Froude numbers, e.g., the maximum velocity, surface velocity, and depth profile, were predicted and compared with experimental results. The characteristics such as the lengths of the roller and the extent of the jump can also be predicted. However, the length characteristics were found to be sensitive to the turbulent kinematic stress. Further improvement to the theory can be made through a clearer understanding of turbulent stresses in a hydraulic jump. The theory brings out the scale effects arising from the Reynolds number and the upstream conditions of the flow. (Singh-ISWS) W75-06531

SHALLOW LAMINAR FLOWS OVER ROUGH

GRANULAR SURFACES, University of the West Indies, St. Augustine (Trinidad). Dept. of Civil Engineering.

H. O. Frielps.

Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 101, No HY3, Proceedings Paper 11166, p 367-384, March 1975. 8 fig, 4 tab, 24 ref, 2 append.

Descriptors: *Laminar flow, *Boundary layers, *Roughness coefficient, *Instrumentation, *Drag, Laboratory tests, Velocity, Flow, Hydraulics, Reynolds number, Shear, Friction. Identifiers: Nusselt equation.

Several investigations have established that at high values of relative roughness mean depths of liquid in laminar shear flow over rough surfaces are greater than the corresponding depths on a smooth surface. In this investigation the nature of the flow field in the vicinity of isolated roughness elements fixed to a smooth base was demonstrated with a flow visualization technique. Velocity profiles measured with an optical velocity meter were shown to be governed by the Nusselt equation, but surface velocity is a function of relative roughness smooth surface. An analytical model was proposed to explain an empirical relationship between friction coefficient, relative roughness, and Reynolds number. The equation developed was used to calculate the product of the coefficient of the of a rehease the results of the coefficient of the of a rehease the results of the coefficient of the of a rehease the results of the coefficient of the of a rehease the results of the coefficient of the of a rehease the results of the coefficient of the of a rehease the results of the coefficient of the of a rehease the results of the coefficient of the of a rehease the results of the coefficient of the of a rehease the results of the coefficient of the of a rehease the results of the coefficient of the coef cient of drag of a sphere resting on a plane surface and the tip Reynolds number and also to demonstrate the influence of velocity distribution on the drag coefficient. (Sinh-ISWS) W75-06532

BED FORM RESPONSE TO NONSTEADY FLOWS.

Army Engineer District, Sacramento, Calif. For primary bibliographic entry see Field 2J. W75-06533

FLOW SEPARATION IN MEANDER BENDS, Leeds Univ. (England). Dept. of Earth Sciences. For primary bibliographic entry see Field 2E. W75-06539

TURBULENT FLOW OF INELASTIC NON-NEWTONIAN FLUIDS IN PIPES, Banaras Hindu Univ., Varanasi (India). Inst. of

S. N. Gupta, and P. Mishra. Indian Journal of Technology, Vol 12, No 5, p 181-185, May 1974. 4 fig, 16 ref.

Descriptors: *Turbulent flow, *Reynolds number, *Fluid friction, *Non-Newtonian flow, *Fluid mechanics, Analysis, Theoretical analysis, Equations, Viscosity, Flow, Friction, *Pipe flow, Pipes. Identifiers: *Fluid properties.

Several theories of turbulent momentum transport for non-Newtonian fluids flowing in pipes were discussed. The Gill-Scher theory was compared with data on power law, nonpower law, and Bingham plastic types of non-Newtonian fluids. It was shown that Newtonian turbulent theory was applicable to non-Newtonian fluids if the proper

Field 8-ENGINEERING WORKS

Group 8B-Hydraulics

constant and the differential viscosity were used. (Adams-ISWS) W75-06542

CONFIDENCE LIMITS FOR DESIGN EVENTS, Department of the Environment, Ottawa (Ontario). Water Resources Branch. For primary bibliographic entry see Field 2E.

MARKOV MIXTURE MODELS FOR DROUGHT LENGTHS.

Harvard Univ., Boston, Mass. Graduate School of Business Administration.
For primary bibliographic entry see Field 2A.

DRAINAGE OF GROUNDWATER RESTING ON A SLOPING BED WITH UNIFORM RAINFALL, Agricultural Research Council, Cambridge (England). Unit of Soil Physics. For primary bibliographic entry see Field 4B. W75-06550

STUDY OF ALTERNATIVE DIVERSIONS. RE-PORT ON THE HYDROLOGICAL STUDIES OF MANITOBA HYDRO SYSTEM.

Underwood, McLellan and Associates Ltd., Winnipeg (Manitoba).

Manitoba Hydro, Winnipeg, Manitoba, Canada, February 12, 1970. 136 p, 67 tab, 32 fig, 4 ref, 4 ap-

Descriptors: *Diversion, *Hydroelectric plants, *Diversion structures, *Hydrologic data, *Water data, *River regulation, *Mathematical studies, Hydroelectric power, Reservoir management, Canada, Routing, Systems analysis, River forecasting, River systems. Identifiers: Manitoba Identifiers: Hydro System. Manitoba(Canada), Churchill River.

A hydrologic study was originated in connection with a systems study of the Manitoba Hydro system conducted during the period October 1969 to February 1970. Realizing the importance of the hydrologic data and its effect on the future planning and operation of Manitoba Hydro, it was decided that a documentation of the hydrologic data that have been collected for use in the data that have been concerned for use in use in systems study is necessary. These hydrologic data were used for various design and system study analysis. Therefore, the hydrological data presented is suitable for use in further conduct of these different analyses. The collection and analysis of the hydrologic data were principally oriented to the broad objective of systems study. Included are the hydrologic data collected and the deter-ministic and probalistic analysis of system firm energy. The statistical analysis of the monthly flows is also presented. These were done to determine the season variations of flow and find the probability distribution of the flows corresponding to different seasons for the major rivers in the project area. The objective of the study was to develop a suitable method of applying the storage utilization technique for the study of the relation between the reservoir system and firm energy. (Poertner) W75-06664

BLAST HOLE BIT TECHNOLOGY. Dresser Industries, Inc., Dallas, Tex. Mining Services and Equipment Div. For primary bibliographic entry see Field 8C. W75-06816

8C. Hydraulic Machinery

SAN LUIS UNIT, TECHNICAL RECORD OF **DESIGN AND CONSTRUCTION - VOLUME II,** DESIGN, SAN LUIS DAM AND PUMPING-GENERATING PLANT, O'NEILL DAM AND PUMPING PLANT, Bureau of Reclamation, Denver, Colo.

For primary bibliographic entry see Field 8A. W75-06468

THE DEVELOPMENT OF A CONTINUOUS DRILL AND BLAST TUNNELING CONCEPT, PHASE II.

Rapidex, Inc., Peabody, Mass. For primary bibliographic entry see Field 8H. W75-06485

SYSTEM FOR REGULATION OF COMBINED SEWAGE FLOWS.

Municipality of Metropolitan Seattle, Wash. For primary bibliographic entry see Field 5D. W75-06563

AUTOMATION OF SCUM SKIMMERS, CALU-MET TREATMENT WORKS, PRELIMINARY SETTLING TANKS. Greeley and Hansen, Chicago, Ill.

For primary bibliographic entry see Field 5D. W75-06665

SCUM REMOVAL FACILITIES, NORTH SIDE TREATMENT WORKS, FINAL SETTLING TANKS

Greeley and Hansen, Chicago, Ill. For primary bibliographic entry see Field 5D. W75-06666

SCUM REMOVAL FACILITIES, WEST-SOUTHWEST TREATMENT WORKS, BATTE-RIES A, B, AND C. Greeley and Hansen, Chicago, Ill.

For primary bibliographic entry see Field 5D. W75-06667

SCUM REMOVAL FACILITIES, NORTH SIDE TREATMENT WORKS, PRELIMINARY SETTLING TANKS.

For primary bibliographic entry see Field 5D. W75-06668 Greeley and Hansen, Chicago, Ill.

SCUM REMOVAL FACILITIES, CALUMET TREATMENT WORKS, FINAL SETTLING TANKS.

Greeley and Hansen, Chicago, Ill. For primary bibliographic entry see Field 5D. W75-06669

BLAST HOLE BIT TECHNOLOGY. Dresser Industries, Inc., Dallas, Tex. Mining Services and Equipment Div.

Bulletin No. BHBT/2-73/5C. 1973, 23 p.

Descriptors: *Drilling equipment, Drilling, Borehole, *Design criteria, Materials engineering, Technology, *Materials testing, *Quality control, Specifications, Evaluation, Testing, Instrumenta-

Identifiers: Bit design, Journal angle, Drillability testing, Testing equipment, Blast hole bit.

The limited amount of space that contains the blast hole bit, the angle of the journal on the arm of the bit (the journal angle or pin angle), the conical angles on the cutters, the length of the bit teeth, the hardfacing of the bit teeth, and the cutter design on the bit are related to the hardness of the forma tion, the depth to be drilled and the diameter and shape of the hole. The materials and properties of the rock bit components and their metallurgical control are discussed (as well as quality control procedures in the Dresser Company). Dull bit evaluation and the causes of rapid drilling are illustrated by examples of the effect of improperly handled or misapplied drill bits. Equipment for measuring the weight of the bit and the optimum rotary speed are explained in order to obtain the correct combination of these factors to insure effi-cient penetration rates. (Bradbeer-NWWA) W75-06816

8D. Soil Mechanics

IMPLEMENTATION PACKAGE FOR A DRAINAGE BLANKET IN HIGHWAY PAVE-MENT SYSTEMS,

Federal Highway Administration, Washington, D.C., Implementation Div. For primary bibliographic entry see Field 4C. W75-06470

ROLLER COMPACTED CONCRETE STUDIES AT LOST CREEK DAM, Army Engineer District, Portland, Oreg.

For primary bibliographic entry see Field 8F.

ANALYSIS OF RELIEF WELLS IN EMBANK-

MENTS, Osmania Univ., Hyderabad (India). Dept. of Civil Engineering. For primary bibliographic entry see Field 4B. W75-06537

METHOD OF EXCAVATING TO FORM OR EN-LARGE A WATERWAY, For primary bibliographic entry see Field 4A.

8E. Rock Mechanics and Geology

BASIC UNDERSTANDING OF EARTH TUN-NELING BY MELTING, VOLUME I - BASIC PHYSICAL PRINCIPLES,

Westinghouse Astronuclear Lab., Pittsburgh, Pa. For primary bibliographic entry see Field 8A. W75-06489

BASIC UNDERSTANDING OF EARTH TUN-NELING BY MELTING, VOLUME II - EARTH STRUCTURE AND DESIGN SOLUTIONS, Westinghouse Astronuclear Lab., Pittsburgh, Pa. For primary bibliographic entry see Field 8A. W75-06490

PERMEABILITY AND EFFECTIVE STRESS, Geological Survey, Menlo Park, Calif. For primary bibliographic entry see Field 2F. W75-06540

8F. Concrete

ROLLER COMPACTED CONCRETE STUDIES AT LOST CREEK DAM, Army Engineer District, Portland, Oreg.

D. J. Hall, and D. L. Houghton. Available from the National Technical Informa-tion Service, Springfield, Va 22161 as AD-780 858, \$4.25 in paper copy, \$2.25 in microfiche. June 1974. 48 p, 19 fig, 9 tab, 7 ref.

Descriptors: *Concrete mixes, *Concrete testing, *Dam construction, *Dams, *Oregon, Concrete technology, Concrete additives, Pozzolans, Linings, Paving, Permeability, Bonding. Identifiers: *Roller compacted concrete, Vebe apparatus, Bedding mixtures, Lost Creek Dam(Ore).

At Lost Creek Dam at Trail, Oregon, on May 13-1973, lean 3-inch maximum size aggregate (MSA) concrete mixtures were designed to be compacted by vibratory rollers. The control mix contained 235 pounds cement per cubic yard while other mixtures had a portion of the total volume of cement replaced with pozzolan, either fly ash or a locally available calcined shale. These mixes contained from 99 to 275 pounds cementitious materials per cubic yard. In addition, two other mixtures (1-1/2-inch MSA and 3/4-inch MSA) were designed and used as a 3-inch starter or bedding mix off the hardened horizontal lift joint. Each layer, except bedding layers, was approximately 8-inches thick after compaction. It was concluded that properly proportioned roller compacted concrete can be effectively placed by soils compaction methods using a vibratory roller. The results of tests on drilled core specimens indicate that permeability d bond test results are similar to conventionally placed lean mass concrete values. The quality of the hardened lift joint is improved with the use of bedding mixtures. A modified Vebe apparatus can be used for control testing and for molding concrete central cylinders. (Sims-ISWS) W75-06491

8G. Materials

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PERMEABILITY AND EFFECTIVE STRESS, Geological Survey, Menlo Park, Calif. For primary bibliographic entry see Field 2F. W75-06540

CAL GROUNDING, East Bay Municipal Utility District, Oakland, Calif. THE WATER UTILITIES LOOK AT ELECTRI-

L. B. Hertzberg.

In: IEEE Transactions on Industry and General Applications, Vol IGA-6, No 3, May/June 1970, Baltimore, Maryland. p 278-281, 6 ref.

Descriptors: *Corrosion control, *Water distribu-tion(Applied), *Municipal water, *Electrical grounding, *Electrolysis, *Metal pipes, Plastic pipes, Pipelines, Water supply, Water con-veyance, Corrosion, Deterioration.

Identifiers: *Non-metallic materials, Anodic pro-

Engineers engaged in design of grounding protection are alerted to the need for development of new, independent, and reliable electrical groundnew, independent, and remains of the water supply distribution system in the early 1950's consisted of isolated fittings and valves. In 1968, the National Electrical Code (NEC) was revised because of the decreasing reliability of water pipe as an electrical ground. The NEC then described a new type of 'made electrode' which could be used where the water piping system or other local metallic underground system was not available. The new grounding electrode, 'Ufer System', used not less than 20 feet of bare copper conductor, encased along the bottom of a concrete foundation footing which is in direct contact with the earth. Steel and cast iron mains are being replaced with discontinuous (or non-metallic) piping because rising copper prices are forcing water utilities to install plastic service laterals. Better corrosion control practices are resulting in insulation of galvanically dissimilar metals, and corrosive soil conditions are leading to use of non-metallic materials for underground piping. This will help supply safe water in adequate amounts for fire protection and all other public needs. (Poertner) W75-06656

ANALYSIS OF ELECTRICAL RESISTIVITY MEASUREMENTS OF SHALLOW DEPOSITS, Iowa State Univ., Ames. For primary bibliographic entry see Field 4B. W75-06808

8H. Rapid Excavation

THE DEVELOPMENT OF A CONTINUOUS DRILL AND BLAST TUNNELING CONCEPT, PHASE II,

Rapidex, Inc., Peabody, Mass.

C. R. Peterson.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 204, \$3.75 in paper copy, \$2.25 in microfiche. DOT-TSC-OST-74-10, May 1974. 76 p, 19 fig, 8 tab, 17 ref. DOT-TSC-611.

Descriptors: *Tunneling, *Tunneling machines, *Excavation, Drilling, Drilling equipment, Rock excavation, Automation, Equipment, Explosives, Construction equipment, Tunnel construction. Identifiers: Blasting.

A spiral drilling pattern was described which of-fers high efficiency drill and blast tunneling via frequent small blasts rather than occasional large blasts. Design work was presented for a machine blasts. Design work was presented for a machine which would stay at the face to provide essentially continuous drilling, loading, blasting, and mucking. Field tests proving the concept were described and photos of the spiral tunnel advance were provided. Successful testing of a suitable blast shield is also described and photos provided. Advance rates of four times conventional drill and blast practice were projected at about half the conventional cost per foot. (Sime, ISWS) nal cost per foot. (Sims-ISWS) W75-06485

BASIC UNDERSTANDING OF EARTH TUN-NELING BY MELTING, VOLUME I - BASIC PHYSICAL PRINCIPLES, Westinghouse Astronuclear Lab., Pittsburgh, Pa.

For primary bibliographic entry see Field 8A. W75-06480

BASIC UNDERSTANDING OF EARTH TUN-NELING BY MELTING, VOLUME II - EARTH STRUCTURE AND DESIGN SOLUTIONS, Westinghouse Astronuclear Lab., Pittsburgh, Pa. For primary bibliographic entry see Field 8A. W75-06490

8I. Fisheries Engineering

FISH PARASITES OCCURRING IN THIRTEEN SOUTHERN CALIFORNIA RESERVOIRS,

California State Univ., San Diego. R. L. Miller, A. C. Olson, Jr., and L. W. Miller. Calif Fish Game. Vol 59, No 3, p 196-206, 1973.

Descriptors: Fish, *Fish parasites, *Fish management, Fisheries, Reservoirs, *California.

Identifiers: Acanthocephala, Cestoda, Digenea, Hirudinea, Monogenea, Nematoda.

Fishes (480) representing 13 freshwater species from 7 genera and 4 families were collected from 13 reservoirs and examined for metazoan parasites Dorosoma petenense, Cyprinus carpio, Notemigonus crysoleucas, Ictalurus catus, I. melas, I. natalis, I. nebulosus, I. punctatus, Lepomis cyanellus, L. macrochirus, Micropterus salmoides, Pomoxis annularis, and P. nigromacu-latus were infected with 1 or more helminths. Parasites found were Digenea: Hysteromorpha triloba, Posthodiplostomum minimum, Uvulifer ambloplitis, and Clinostomum marginatum; Monogenea: Dactylogyrus extensus, Cleidodiscus pricei, Urocleidus dispar, U. ferox, U. furcatus, U. principalis, and Actinocleidus fusiformis; Cestoda: Corallobothrium fimbriatum, C. giganteum, Proteocephalus ambloplitis, Proteocephalus sp., and Bothriocephalus claviceps; Nematoda: Contracacum sp. and Eustrongylides sp.; Acanthocephala: Southwellina hispida; and Hiru-dinea: Myzobdella moorei. Of these 20 parasites, 4 are new records for California. This survey will

provide some baseline data for fisheries management in San Diego County and southern Califor-nia.--Copyright 1974, Biological Abstracts, Inc. W75-06416

POPULATION DYNAMICS OF HUNTERELLA NODULOSA (CESTOIDEA:CARYOPHYLLIDEA) IN AL-

Calgary Univ. (Alberta). Dept. of Biology. D. R. Mudry, and H. P. Arai. Can J Zool Vol 51, No 7: p 787-792, 1973. Illus.

Descriptors: *Infection, *Fish diseases, Fish populations, *Canada, *Worms. Identifiers: Caryophyllidea, Catostomus-commersoni, Cestoidea, Hunterella-nodulosa.

Incidence, intensity, and population size distribu-tion of 5669 individuals of H. nodulosa from 646 Catostomus commersoni were examined. Incidence of infection increased with fish weight up to about 50 g. In fish above 50 g the incidence remained fairly constant at about 70%. Intensity of infection was directly proportional to fish weight. No seasonal changes in incidence and intensity were observed. Seasonal changes in frequency dis-tribution of worm size classes indicated a seasonal infection cycle.--Copyright 1974, Biological Abstracts, Inc.

WATER INTAKE AND FISH RETURN SYSTEM, Envirex, Inc., Waukesha, Wis. (assignee) R. F. Taylor, D. A. Strow, and H. Mansouri. U.S. Patent No. 3,868,324, 4 p, 5 fig, 9 ref; Official Gazette of the United States Patent Office. Vol 931, No 4, p 1647, February 25, 1975.

*Patents, *Fish barriers, Descriptors: passages, *Screens, Fish, Rivers, Water levels, Water quality. Identifiers: *Fisheries engineering, Fish screens.

The water intake structure is located alongside a natural watercourse. A number of travelling water screen units are arranged in a straight line between support columns and the screens are flush with the columns. The line extends at a sharp angle screen mns. The line extends at a sharp angle across and downstream of the channel to a gate opening into a holding channel so that the intake stream from the watercourse approaches the screens at a sharp angle. The fish are unobstructed in moving ward to avoid successively the several screens until reaching the gate which opens into a fish holding channel. Periodically the gate is closed and the fish are screened or flushed into the water-course. Other suitable means of returning the fish to natural waters may also be provided. Both the travelling water screen units and the fish holding. channel and return apparatus may be of whatever height is required to accommodate the fluctuations which must be expected in the water level of the watercourse. (Sinha-OEIS)

BENTHIC FAUNA OF PONDS OF THE KARAMET-NIYAZ FISH-BREEDING FARM, Akademiya Nauk Turkmenskoi SSR, Ashkhabad. Institut Zoologii i Parazitologii. R. E. Muravleva, and O. V. Zhitnikova. Izv Akad Nauk Turkm SSR Ser Biol Nauk. 4, p 45-51, 1973, Illus, (In Russian). Identifiers: *Benthic fauna, *Fish hatcheries, Insects, Invertebrates, Ponds, Productivity, sects, Invertebrates, *USSR(Karamet-Niyaz).

Benthic invertebrates rapidly colonize the ponds (Karamet-Niyaz, USSR). The formation of benthic fauna occurs because of oviposition by inobsenting rands occurs because of overposition by in-sects from the nearby ponds and because of inver-tebrates brought in by the water from the canal supply system. Productivity of zoobenthosis on the stage of the formation is low.—Copyright 1974, Biological Abstracts, Inc. W75-06710

Field 8—ENGINEERING WORKS

Group 81—Fisheries Engineering

PARASITIC FAUNA AND DISEASES OF JU-VENILE CARP REARED IN HATCHERIES AND IN SPAWNING PONDS, (IN RUSSIAN), Akademiya Nauk Litovkkoi SSR, Vilnius. Institut

Zoologii i Parazitologii. V. P. Kyamezha, and A.-D. Y. Zhalyunene

Liet Tsr Mokslu Akad Darb Ser C, 3 p 69-76, 1973.

English summary.
Identifiers: *Carp, Cyprinus-carpio, Fauna,
*Hatcheries, Juveniles, *Parasitic infection(Fish),
Spawning ponds, *Fish parasites, *Fish diseases.

The larvae of hatchery reared carp (Cyprinus carpio) are not infected by parasites, but when reared in epizootically unfavorable ponds they are liable to parasite infection. If proper sanitary conditions are provided in ponds the hatchery method of carp reproduction can be recommended as a suffireproduction can be recommended as a sur-ciently effective remedy for fighting carp infection diseases. (More than 20 parasite spp. are given.)— Copyright 1974, Biological Abstracts, Inc. W75-06850

9. MANPOWER, GRANTS AND FACILITIES

9A. Education (Extramural)

TENTH ANNUAL REPORT, PROGRAM AC-TIVITIES, FISCAL YEAR, 1974, Massachusetts Univ., Amherst. Water Resources Research Center. For primary bibliographic entry see Field 9D. W75-06646

9D. Grants, Contracts, and Research Act Allotments

LAND AND WATER RESEARCH, ANNUAL RE-

PORT 1974,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.

Available from the National Technical Informa-Avanable from the National Technical Informa-tion Service, Springfield, Va 22161, as PB-240 976, \$3.75 in paper copy, \$2.25 in microfiche. Informa-tion Report No 73, December 1974. 41 p. OWRR A-999-PA(3).

Descriptors: *Water pollution, *Waste water treatment, *Economic impact, *Social impact, *Tourism, *Acid mine, *Hydrology, *Reservoirs, *Solid wastes.

'Solid wastes, 'Acquisition practices, 'Soil productivity, 'Roadside ecology, 'Economic data systems, 'Hydrogeologic studies, 'Sewage information retrieval.

This publication supplements Information Report Number 72, the Fiscal Year '74 Annual Report. This publication, which includes photographs and narrative sections, highlights activities of the Water Resources Research Center, the Land Resources Research Center and the Regional Analysis Center in scholarly research and involve-ment in public affairs. As an indication of the in-terdisciplinary nature of the Institute, the work of 181 University personnel, representing 8 colleges and 26 academic departments at Penn State is feaand 26 academic departments at Penn State is rea-tured. Sections describing research projects are grouped as follows: (1) Projects completed during Fiscal Year 1974; (2) Projects continued during Fiscal Year 1974; (3) Projects initiated during Fiscal Year 1975. Numerous broad lines of research are reported with concentrations in such areas as: water pollution control; renovation of waste water; management of watersheds; control of aquatic plant growth; development of water supply and waste water systems to meet regional needs; the economic impact of highways; land use planning; social impact of water reservoir develop-ment; biological and engineering studies of land and water resources; economic efficiency studies; acid mine water neutralization; soil productivity; roadside ecology; and solid waste disposal. (Sink-W75-06357

TENTH ANNUAL REPORT, PROGRAM ACTIVITIES, FISCAL YEAR, 1974,
Massachusetts Univ., Amherst. Water Resources

Research Center.

Available from the National Technical Informa-tion Service, Springfield, Va 22161, as PB-241 152, \$5.25 in paper copy, \$2.25 in microfiche. (1974), 94 p, 12 ref. OWRT A-999-MASS(11).

*Water Massachusetts, *Universities, Colleges, Educa-tion, Training, *Programs, Projects, *Research and development, Grants, Contracts, Water Resources Research Act.

During the 1974 fiscal year the Massachusetts Water Resources Research Center supported a total of 29 new and continuing projects. Of this total, 20 projects were supported in part under Section 100 of the Water Resources Research Act of 1974 (allotment grant), 6 under Section 101 (matching grant), and 3 under Title II. Forty-two faculty members in 18 University departments were engaged, in otherwise associated with, Center-supported research. A total of 68 students, most of them graduate students, worked on these research projects. W75-06646

10. SCIENTIFIC AND TECHNICAL INFORMATION

10C. Secondary Publication And Distribution

MARINE RADIOECOLOGY: A SELECTED BIBLIOGRAPHY OF NON-RUSSIAN LITERA-

Environmental Protection Agency, Boise, Idaho. For primary bibliographic entry see Field 5C. W75-06384

RESOURCE CONSERVATION GLOSSARY. Soil Conservation Society of America, Ankeny, Iowa, 1970. 52 p.

Descriptors: Information exchange, Classifica-tion, Documentation, *Conservation, *Resources, *Thesauri, Agronomy, Biology, Ecology *Thesauri, Agronomy, Biology, Ecology, Economics, Engineering, Forestry, Geology, Hydrology, Ranges, Recreation, Soils, Hydrology, Ranges, Re Watersheds(Basins), Indexing. Identifiers: *Glossaries.

Terms were included that are regularly used in the selected technologies of agronomy, biology, con-servation, ecology, economics, engineering, forestry, geology, hydrology, range, recreation, soils, and watersheds. The glossary was intended to serve as a reference for professionals and laymen as well as students. (Humphreys-ISWS) W75-06483

WATER REUSE, A BIBLIOGRAPHY, VOLUME

Office of Water Research and Technology, Washington, D.C.
For primary bibliographic entry see Field 5D.
W75-06638

WATER REUSE, A BIBLIOGRAPHY, VOLUME

Office of Water Research and Technology, Washington, D.C. For primary bibliographic entry see Field 5D. W75-06639

INTERSTATE WATER COMPACTS, A BIBLIOGRAPHY, Office of Water Research and Technology, Washington, D.C. For primary half-For primary bibliographic entry see Field 6E. W75-06640

IMPACT ASSESSMENT: ANALYTIC BIBLIOGRAPHY, Brown Univ., Providence, R.I. For primary bibliographic entry see Field 6B. W75-06758

10E. Translations

METEOROLOGICAL INTERPRETATION OF SPACE PHOTOGRAPHS OF THE EARTH (QUANTITATIVE METHODS), For primary bibliographic entry see Field 7C. W75-06488

10F. Preparation Of Reviews

A REVIEW OF THE LITERATURE ON THE USE OF DIURON IN FISHERIES, Bureau of Sport Fisheries and Wildlife, Columbia, Mo. Fish-Pesticide Research Lab. For primary bibliographic entry see Field 5C.

A REVIEW OF THE LITERATURE ON THE USE OF SQUOXIN IN FISHERIES, Bureau of Sport Fisheries and Wildlife, Cook, Wash. Western Fish Nutrition Lab. For primary bibliographic entry see Field 5C. W75-06386

A REVIEW OF THE LITERATURE ON THE USE OF COPPER SULFATE IN FISHERIES, Bureau of Sport Fisheries and Wildlife, Marion, Ala. Southeastern Fish Cultural Lab. For primary bibliographic entry see Field 5C. W75-06387

A REVIEW OF THE LITERATURE ON THE USE OF ROTENONE IN FISHERIES Bureau of Sport Fisheries and Wildlife, LaCrosse, Wis. Fish Control Lab. For primary bibliographic entry see Field 5C. W75-06388

A REVIEW OF THE LITERATURE ON THE USE OF ENDOTHALL IN FISHERIES, Bureau of Sport Fisheries and Wildlife, Denver, Colo. Fish Pesticide Research Lab. For primary bibliographic entry see Field 5C. W75-06389

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